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SENSITIVE PLANT SURVEY IN THE
TOBACCO ROOT MOUNTAINS, MADISON COUNTY, MONTANA
BEAVERHEAD AND DEERLODGE NATIONAL FORESTS

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EXECUTIVE SUMMARY

Sensitive plant surveys were conducted in the Tobacco Root Mountains of the Beaverhead and Deerlodge National Forests in 1994, resulting in the discovery of seventeen populations of six Montana plant species of special concern. These include ten populations of pink agoseris (*Agoseris lackschewitzii*), three populations of alpine nerved sedge (*Carex neurophora*), and one population each of limestone larkspur (*Delphinium bicolor* ssp. novum), Austin's knotweed (*Polygonum douglasii* ssp. *austinae*), five-leaf cinquefoil (*Potentilla quinquefolia*) and northern spikemoss (*Selaginella selaginoides*). This report gives information on these six species and on four others which are known or reported from the Tobacco Roots vicinity. Beaked spikerush (*Eleocharis rostellata*) and giant helleborine (*Epipactis gigantea*) occur on private land inholdings adjacent to the Beaverhead National Forest at Potosi Hot Springs. Two species, slender paintbrush (*Castilleja gracillima*) and Rocky Mountain dandelion (*Taraxacum eriophorum*), are reported from the area based on historical collections made in the vicinity of the Tobacco Root Mountains, with imprecise location data. Wind River Draba (*Draba ventosa*) was reported to have been collected from the Beaverhead National Forest at Bell Lake but the identification was in error. Of the ten species, *Agoseris lackschewitzii*, *Polygonum douglasii* ssp. *austinae*, *Epipactis gigantea*, and *Castilleja gracillima* currently have U.S. Forest Service Region 1 sensitive status. The *Selaginella selaginoides* is recommended for sensitive designation, and the *Delphinium bicolor* ssp. novum for deletion from the state species of special concern list. Included in this report are site-specific information and status information on the above species, and a list of all vascular plant taxa identified on the national forests in the Tobacco Root Mountains.

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INTRODUCTION

This report describes a sensitive plant survey of Beaverhead and Deerlodge National Forest lands in the Tobacco Root Mountains. The purpose of this work was to locate and evaluate populations of plant species designated sensitive by Region 1 of the U.S. Forest Service (USDA Forest Service 1994a) and prospective sensitive species currently tracked by the Montana Natural Heritage Program as plant species of special concern (Heidel 1994). Surveys to determine the status of rare plant species are being conducted throughout the west in response to the Endangered Species Act of 1973 and subsequent conservation initiatives by the U.S. Forest Service and other agencies. The results of these surveys serve as a botanical baseline to aid in identifying conservation priorities and developing protection and compatible management strategies. A secondary goal of this project was the development of a preliminary floristic list for the range.

Prior to this study, the flora of the Tobacco Roots, especially sensitive plants, had not been well studied. It was an area identified as having a high potential for sensitive species as indicated by existing information on occurrences of sensitive plants in the range and in nearby ranges. It is also an area in the National Forest system with many project proposals and where efforts to employ ecosystem management planning are underway (Joy, pers. commun.), making a botanical baseline all the more important.

THE STUDY AREA

The Tobacco Root Mountains are a high, rugged range in Madison County in southwestern Montana. Figure 1 is a map of the study area. The range is isolated from mountains to the east, north, and west by the broad valleys of the Madison, Jefferson, and Ruby rivers. A zone of low foothills separates the Tobacco Roots from the Gravelly Range to the south. Elevations range from about 1,525 meters (5,000 feet) on the valley floors to over 3,050 meters (10,000 feet) on many high peaks. In the valleys, the climate is semi-arid with warm summers and cold winters, but in the mountains the climate is considerably colder and wetter with heavy accumulations of snow in the winter. Climate data from Virginia City (Boast and Shelito 1989), highest elevation (5,823 feet) of nearby monitoring stations, is taken to represent the lower montane climate of the Tobacco Roots. The monthly mean of the average daily temperature ranges from -5.7°C (21.8°F) in January to 18.3°C (64.9°F) in July. Average annual precipitation is 24.38 cm (9.16 in), much of it falling in late winter through early summer. Elevation and microclimate significantly alter this climate regime.

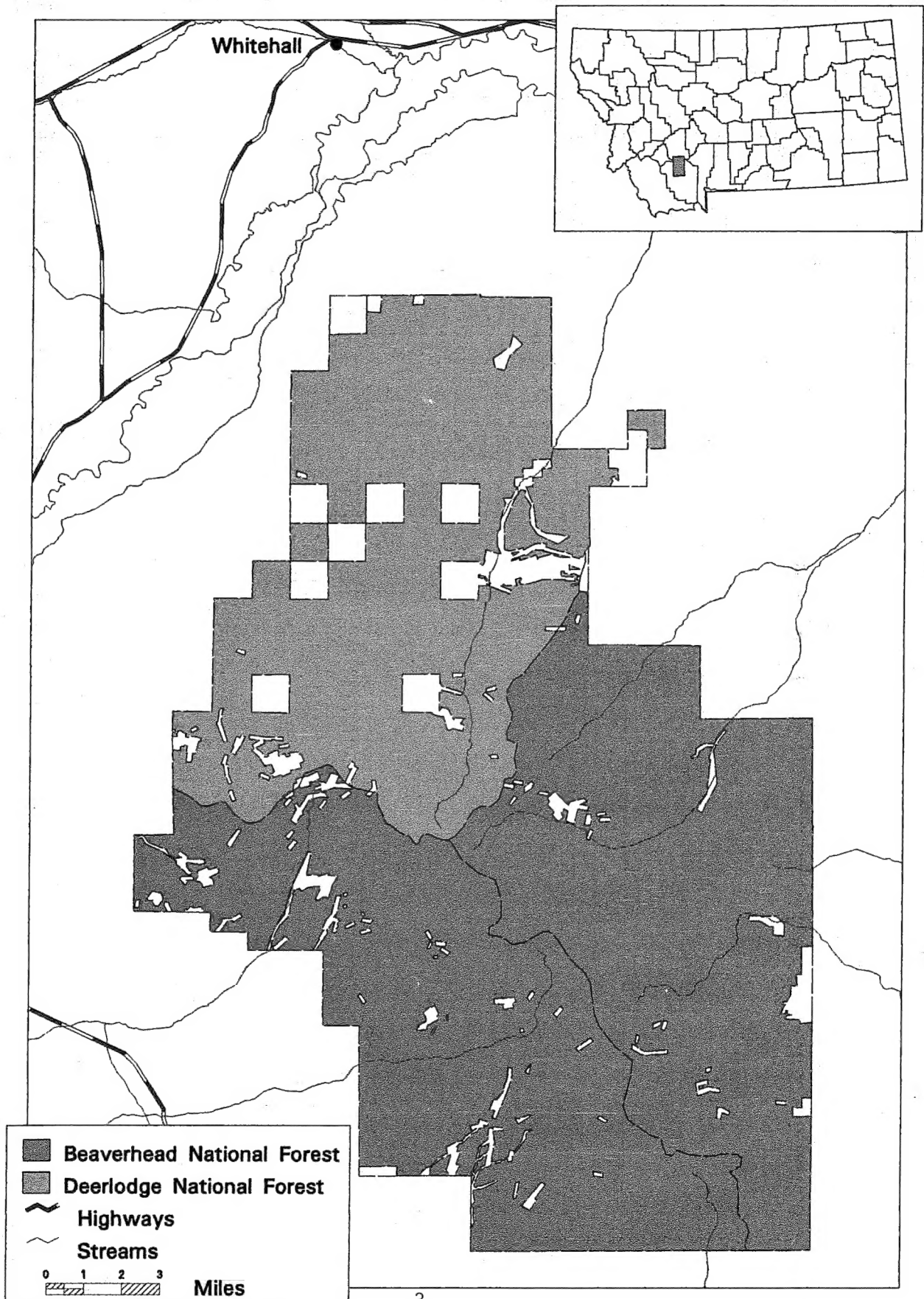
The Tobacco Root Range is composed mostly of Precambrian metamorphic rocks (gneiss and schist) which surround a central granitic batholith implaced during the Cretaceous period (Alt and Hyndman 1986). Paleozoic and Mesozoic sedimentary rocks (limestone, sandstone, shale) are found only along the northwestern flank of the range (Tansley et al. 1933). The higher elevations of the range were shaped by Pleistocene glaciation, as evidenced by cirques, wide U-shaped valleys, and hummocky morainal topography. Quaternary alluvial formations are common at the mouths of the canyons of the steep western flank of the range, but are less common on the more gentle eastern flank (Tansley et al. 1933).

Vegetation types in the study area are diverse, ranging from mountain mahogany, dry prairie and sagebrush steppe communities at the lower elevations to well-developed alpine communities at the highest elevations. Coniferous forests cover much of the middle elevations, and include stands of Douglas fir, limber pine, and lodgepole pine in the montane zone and Engelmann spruce, sub-alpine fir, and whitebark pine in the sub-alpine zone. Various open habitats (meadows, talus and outcrop slopes) occur in mosaic with the forests. Lakes, wetlands and riparian zones cover significant areas, especially in the glaciated valleys and basins.

Except for peripheral foothills, most land in the Tobacco Root Mountains is administered by the U.S. Forest Service. The southern part of the range is in the Beaverhead National Forest (Madison District) and the northern in the Deerlodge National Forest (Jefferson District). There are many private inholdings, residential areas mainly in and around Mammoth and Pony, and numerous mining claims. National Forest lands in the Tobacco Roots are utilized by a number of commercial and recreational interests. Commercial uses include cattle grazing, logging, and mining. Recreation in the range includes camping, fishing, hunting, hiking, and increasingly, use of 4-wheel drive and all-terrain vehicles.

Figure 1

Tobacco Root Mountains Study Area



METHODS

Prior to fieldwork, a preliminary list of target plant species was compiled to guide timing and selection of habitats to be searched (Appendix A). This list included all sensitive plant species and Montana plant species of special concern (Heidel 1994) then known from the Tobacco Roots vicinity, as well as those known from other nearby ranges with similar habitats (mainly the Madison, Pioneer, and Gravelly ranges). Just two species of special state concern, *Agoseris lackschewitzii* and *Draba ventosa*, had previously been reported from National Forest lands in the Tobacco Roots, and the latter may be based on misidentification (see p. 6). In addition, two species associated with hot springs, *Eleocharis rostellata* and *Epipactis gigantea*, were known from private inholdings in the range, and a third rare species, *Astragalus platytropis*, was known from BLM land in the northwest foothills of the range. Two more rare species, *Castilleja gracillima* and *Taraxacum eriophorum* were reported from the vicinity of the Tobacco Roots based on old collections with imprecise location data. Three of these seven target species, *Agoseris lackschewitzii*, *Castilleja gracillima*, and *Epipactis gigantea* are currently designated sensitive species by Region 1 (USDA Forest Service 1994a).

Beaverhead and Deerlodge National Forest lands in the Tobacco Roots were surveyed for sensitive plants in the summer of 1994 by Bonnie Heidel (May 31-June 2, June 6, 7, 10-12, 19-21, August 4, 10, 11) and Jim Vanderhorst (July 24-26, August 1-4, 7-10, 18-20). Appendix B shows the primary search routes on two map pages spanning the study area. Fieldwork by Heidel was concentrated in the Manhead Mountain, Old Baldy, and Whitehall quadrangle areas on the Deerlodge National Forest, while fieldwork by Vanderhorst was concentrated in the Noble Peak, Potosi Peak, and Ramshorn Mountain quadrangle areas in the Beaverhead National Forest. The fieldwork and herbarium work conducted was not a comprehensive evaluation but a compilation and baseline for reference in biological assessments and evaluations.

A wide ecological spectrum of habitats and significant geographical extent of the range was sampled. Target species were searched for in appropriate habitats and at appropriate times of season for identification. June and July work concentrated on targets of drier, lower elevation habitats while August surveys concentrated on wetland and alpine species. Whenever sensitive species or species of concern were encountered, standard field forms were filled out and the populations were mapped. For each population, data was collected on habitat (associated vegetation, landscape position, geology, soils), demography (population numbers and area covered), plant biology (phenology, vigor, reproductive success), and potential threats to the populations. Photographs (35 mm slides) were taken of the plants and their habitats as conditions permitted.

Uncommon plant communities and plant distribution patterns were sought and noted in the course of the sensitive plant survey study, e.g., the exceptional fen site on the east side of the range near the head of Leonard Creek in hummocky moraine topography with an extremely well developed floating mat of sphagnum moss (Suzuki, pers. commun.).

All vascular plants encountered were identified to the extent possible, in order to consider prospective sensitive species not included in the original target list, and to compile a preliminary floristic list for the range. The primary references used to key out plants in the field were Dorn (1984, 1992) and Hitchcock and Cronquist (1973). Specimens were collected when field identification was difficult, and to document populations of sensitive and other notable species. All collections will be deposited at the herbarium of Montana State University (MONT) and duplicates will go to the University of Montana (MONTU).

RESULTS

Seventeen previously unknown populations of six Montana plant species of special concern were documented on the Beaverhead and Deerlodge National Forests in the Tobacco Roots. The species are *Agoseris lackschewitzii* (10 populations), *Carex neurophora* (3), *Delphinium bicolor* ssp. *novum* (1), *Polygonum douglasii* ssp. *austinae* (1), *Potentilla quinquefolia* (1), and *Selaginella selaginoides* (1). Five of these six species were not previously known from the range. In addition, three previously known occurrences of *Agoseris lackschewitzii* were relocated and surveyed. *Agoseris lackschewitzii* and *Polygonum douglasii* ssp. *austinae* are designated Sensitive by Region 1 of the U.S. Forest Service (USDA Forest Service 1994a). *Carex neurophora*, *Draba ventosa*, *Potentilla quinquefolia*, and *Selaginella selaginoides* are currently ranked S1 by the Montana Natural Heritage Program (Heidel 1994), meaning they are known from very few occurrences in the state and are considered critically imperiled. *Delphinium bicolor* ssp. *novum* is now known from many sites and has a broad distribution in the state but the Tobacco Root population is the first found on national forest. These results are summarized in Table 1, and depicted in a map showing the locations of all known occurrences (Figure 2). Element Occurrence Records and maps showing precise locations for these populations are given in Appendix C.

The historical occurrence of *Taraxacum eriophorum* collected from near Sheridan was not relocated. Appropriate lowland habitat for this species in the southern foothills on the Beaverhead National Forest was not surveyed. Herbarium research and consultation has led us to the conclusion that one of the sensitive species previously reported from the Tobacco Roots vicinity, *Castilleja gracillima*, is based on misidentified and dubious specimens, the latter which cannot be categorically ruled out (see species' discussion).

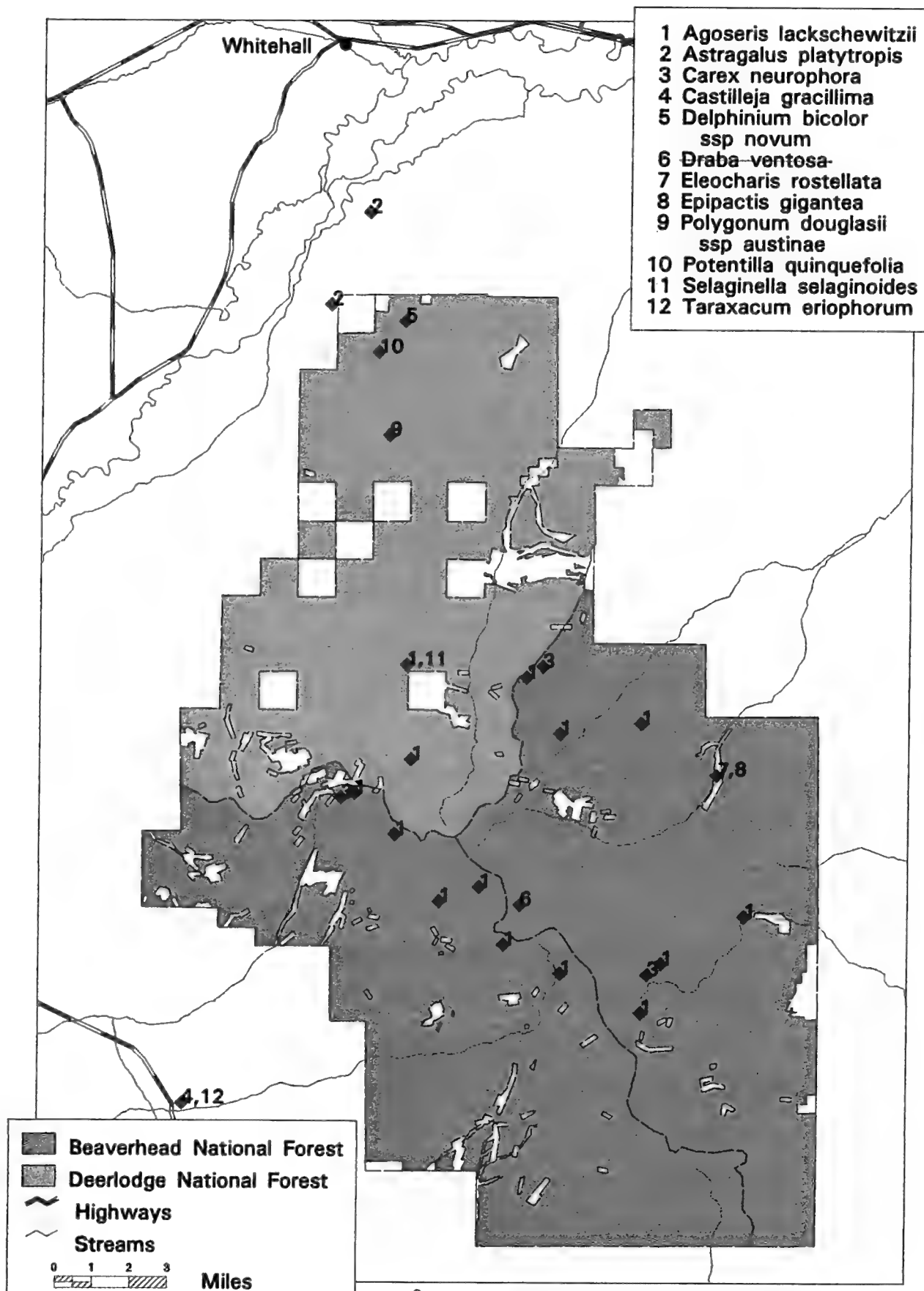
In addition to the species of special state concern documented in the Tobacco Roots, field information was collected on two species recently deleted from tracking by the Montana Natural Heritage Program, *Claytonia lanceolata* var. *flava* (yellow form) and *Selaginella watsonii*; plus a third species which is under review for possible tracking, *Castilleja nivea*. *Claytonia lanceolata* var. *flava* was documented on the Deerlodge National Forest in forest-edge habitat above Guyomon Spring, and on Beaverhead National Forest in both meadow and forest edge habitat on mesic east- and north-facing slopes along North Willow Creek above the Pony trailhead. *Selaginella watsonii* was observed in the alpine above Curly Lakes on Deerlodge National Forest and previously collected by Peter Lesica on Horse Mountain on Beaverhead National Forest. *Castilleja nivea* was observed in alpine habitat on Ramshorn Peak and was collected from an alpine setting on an unnamed flat-topped mountain to the west of Branham Peaks, both sites on the Beaverhead National Forest.

Separate survey studies were conducted in 1994 on select areas of adjoining foothills and surrounding valleys apart from the Tobacco Roots project, producing information on four other species of special state concern (*Astragalus platytropis*, *Scirpus nevadensis*, *Spiranthes diluvialis*, and *Triglochin concinnum* var. *debile*), and their unlikelihood of being found on national forest in the Tobacco Roots. The *Astragalus platytropis* is found on foothills in the Gold Hill area administered by the Bureau of Land Management, and is depicted in Figure 2. The other three species are in low elevation floodplain habitats; the *Spiranthes diluvialis* is a newly-discovered addition to the state flora (pending final confirmation) which is federally listed as threatened under the Endangered Species Act of 1974.

One other plant which deserves separate mention is a possibly undescribed *Draba* which was previously collected in the range (Peter Lesica, pers. commun.) and was also collected by each of the authors of this report. This small plant is morphologically similar to *Draba densifolia*, a Montana species of special concern, but differs subtly in the type and placement of trichomes on the leaves, having an assortment of branched and unbranched hairs borne on the leaf blades as well as on the margins. The taxon may be an agamosperous clone or complex, as evidenced by poor pollen stainability (P. Lesica, pers. commun.). Although its proper taxonomic treatment is as yet uncertain, this plant appears to be common in several high mountain ranges in southwestern Montana (Lesica, pers. commun.). This undescribed species of *Draba* is tentatively considered to correspond with the material collected in the Tobacco Roots by J. C. Whitham (937) in 1931 on the dam at Bell Lake in what was then Gallatin National Forest (now Beaverhead National Forest) and originally identified as *Draba ventosa* (its location is shown under this original determination in the Figure 2 map). Duplicate specimens of it were deposited at Montana State University (MONT) and at the Gallatin National Forest herbarium at the Supervisors Office in Bozeman (now merged into the collection of the Intermountain Research Station - Missoula). These specimens are in flower, without mature fruit, and key out to *Draba densifolia* in Hitchcock et al. (1984) based on their leaf and pubescence characteristics, yet match other specimens identified as *Draba ventosa* at MONT by these same characteristics. There may be a need for review of other Montana material identified as *Draba densifolia*, *D. ventosa* and this undescribed taxon. The Bell Lake area, including the dam and surrounding alpine slopes and summits, was surveyed for *Draba* by both authors of this report. Further consultation and investigation into this unresolved taxonomic question will be pursued subsequent to this project. While it appears unlikely to warrant attention as a sensitive species of the U.S. Forest Service or as a state species of special concern at this time, it may be endemic to Montana, and will be placed in the "Watch" category for taxa of undetermined status.

Figure 2

Sensitive Plant Locations in the Tobacco Root Mountains



A total of 603 vascular plant taxa in 68 families were documented in the study area. These are listed in Appendix D. Four hundred and eleven of these were found in the Beaverhead National Forest and 461 were found in the Deerlodge National Forest, with 269 shared by the two Forests. Fifty species (8.2 % of the total) are not native to North America; most are of Eurasian origin and many of these are potentially serious weeds.

The remainder of this section is devoted to summaries of information on each of the six species of special concern documented by this project. In addition, summaries are given for two species, *Eleocharis rostellata* and *Epipactis gigantea*, found on adjacent private land around Potosi Hot Springs which may be impacted by Forest Service activities (e.g. road building and maintenance); *Epipactis gigantea* is designated Sensitive by Region 1 (USDA Forest Service 1994a). Abbreviated treatments for *Castilleja gracillima* and *Taraxacum eriophorum* are also included, species which were not located by this project, but which are reported from the vicinity based on old collections.

For each full species summary, subheadings include description, present legal or other formal status, geographic distribution, habitat, population demography and biology, and management concerns in the study area. The information is based on data collected from populations in the study area as well as from other occurrences of the species in Montana. Color xeroxes of slides are included as available, and augmented by illustrations. Throughout these summaries, individual populations are referred to by their survey site name and the three digits of their element occurrence code given on their Element Occurrence Records (Appendix C).

Table 1. Populations of sensitive plant species and plant species of special state concern documented in the Tobacco Root Mountains on the Beaverhead and Deerlodge national Forests. Columns are included for the current Montana Natural Heritage Program global and state rank (Heidel 1994) and U. S. Forest Service Region 1 status (USDA Forest Service 1994a).

Scientific name	Current MTNHP GRANK/SRANK	Current USFS Region 1 status	# populations on Beaverhead	# populations on Deerlodge
<i>Agoseris lackschewitzii</i>	G3 S2S3	sensitive	12	2
<i>Carex neurophora</i>	G4 S1	-	3	-
<i>Delphinium bicolor</i> ssp. novum	G3 S3	-	-	1
<i>Eleocharis rostellata</i>	G5 S1	-	1*	-
<i>Epipactis gigantea</i>	G4 S2	sensitive	1*	-
<i>Polygonum douglasii</i> ssp. austinae	G5T4 S2S3	sensitive	-	1
<i>Potentilla quinquefolia</i>	G4 S1	-	-	1
<i>Selaginella selaginoides</i>	G5 S1	-	-	1

* *Eleocharis rostellata* and *Epipactis gigantea* occur on private land at Potosi Hot Springs, which is surrounded by the Beaverhead National Forest and is potentially impacted by USFS activities and management.

Agoseris lackschewitzii Henderson and Moseley
Pink *Agoseris*

A. Description

1. **General description:** *Agoseris lackschewitzii* is a pink flowered member of the chicory or lettuce tribe (Chichorieae) in the aster family (Asteraceae). Members of this tribe are distinguished by having heads consisting entirely of ray flowers (flowers with a flattened petal-like appendage) and having milky juice. The flower heads look much like a pink dandelion (Figure 3), giving the genus one of its common names, false dandelion. The plants are herbaceous perennials with a rosette of basal leaves and one or more leafless flower stalks. The flower heads are enclosed by series of light green bracts which are covered with long translucent hairs and have a purple stripe down the middle and purple mottling (Figure 4). The base of the pink corollas is encircled by a pappus of a double series of slender white bristles; in fruit the pappus expands to carry the fruit in air currents to disperse the seed. The fruits are one seeded achenes with constricted beaks that are shorter than their bodies.

At all but one site observed by the authors, plants were in a fruiting stage with many fruits already dispersed by early to mid-August. *Agoseris lackschewitzii* has been collected, usually in flower, from late June through August in Montana. The 1994 flowering period had culminated by late July in the Tobacco Roots under hot, dry weather. The single flowering plant observed during this project occurred at a low elevation on a beaver dam at North Meadow Creek (056) on August 8; flowering may have been delayed by cold air inversions or extremely wet conditions at the microsite.

2. **Technical description** (quoted from Henderson et al. 1990): Plants perennial herbs with simple or branched caudex and a slender taproot, producing a basal rosette and 1-3 scapes. Leaves thin, oblanceolate, (4)6-20(27) cm long, 0.7-2.2(3.1) cm wide; blade margins entire to rarely distantly toothed, both surfaces glabrous, the apex acute, slightly revolute, with a purple mucro, the base attenuate; petiole broadly to narrowly winged, 1/3 to 1/2 the length of the leaf, sheathing at the base, the margins villous with spreading multicellular hairs with clear crosswalls. Scape 6-49 cm high, villous at base, becoming tomentose below the solitary head. Involucre campanulate, remaining so in fruit, 1.1-1.9 cm long in flower, up to 2.5 cm long in fruit; phyllaries mostly imbricate in 3-4 series, light green with a dark purple median stripe and light to heavy purple mottling, the inner lanceolate, acute, with white scarious margins, the outer similar or slightly broader and obtuse, densely villous basally, less so towards the apex, the trichomes eglandular, translucent or occasionally with some purple





Figure 4 p. 13

pigment. Receptacle slightly convex, up to 7 mm broad, chaffy, oveolate. Flowers all ligulate, perfect, 50-70 per head, pink at anthesis, drying to deep pink; ligules 5-10 mm long, 1.5 mm wide, 5-toothed, glabrous distally, pubescent proximally with few, multicellular hairs; tube 6.5 mm long; anthers 1.2-1.8 mm long, the apical appendages lanceolate, 0.2-0.3 mm long; style column 8-9 mm long, purple, scabrous; style branches 0.4-0.8 mm long, stigmatic for entire length, the abaxial surface scabrous on the ribs, glabrous to sparsely pubescent with short unicellular hairs between the ribs, gradually tapering to a slender, obscurely nerved or nerveless beak shorter than the body, the beak 4.2-6.6 mm long. Pappus double; capillary bristles numerous, white, minutely scabrous, 6-12 mm long.

3. **Diagnostic characters:** In Montana, *Agoseris lackschewitzii* is easily distinguished from other species of the genus by its flowers which have pink corollas when they are fresh. In fruit, characters which can be used to separate the species are the involucre bracts, which are villous with non-glandular hairs and are purple striped and mottled and have obtuse tips, and the achenes which have beaks 1/2 to 2/3 the length of their bodies (Henderson et al. 1990). In the Tobacco Roots, *Agoseris glauca* and *A. auriantica* also occur, but *A. lackschewitzii* is usually, but not always, the only species to inhabit saturated soils.

B. Present legal or other formal status

1. Federal

a. **U.S. Fish and Wildlife Service:** none

b. **U.S. Forest Service:** Sensitive in Region 1 (USDA Forest Service 1994a), and Region 4 (USDA Forest Service 1994b).

2. **State:** The Montana Natural Heritage Program ranks the species G3 and S2S3 (Heidel 1994). This means that globally the species is "either very rare and local, or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors," having in the range of 21-100 occurrences. In the state it is somewhat more imperiled, indicated by the intermediate status rank, S2S3. In Wyoming, the Wyoming Natural Diversity Database ranks the species S2 (Fertig 1994). There is some question as to what constitutes a viable population for this species, since it appears to have many "waif" populations of 10 stems or less that may be non-viable.

C. Geographical distribution

1. **Species range:** When originally described, it was considered to be a regional endemic of southwestern Montana and adjacent Idaho (Henderson et al. 1990). It has subsequently

been collected in southcentral Montana, northwestern Wyoming (Fertig 1994), and the Canadian Rockies of Alberta and British Columbia, while the center of its known distribution remains in Montana. The taxonomic disposition of material west of the Trench in British Columbia is unclear at this time (Achuff, pers. commun.).

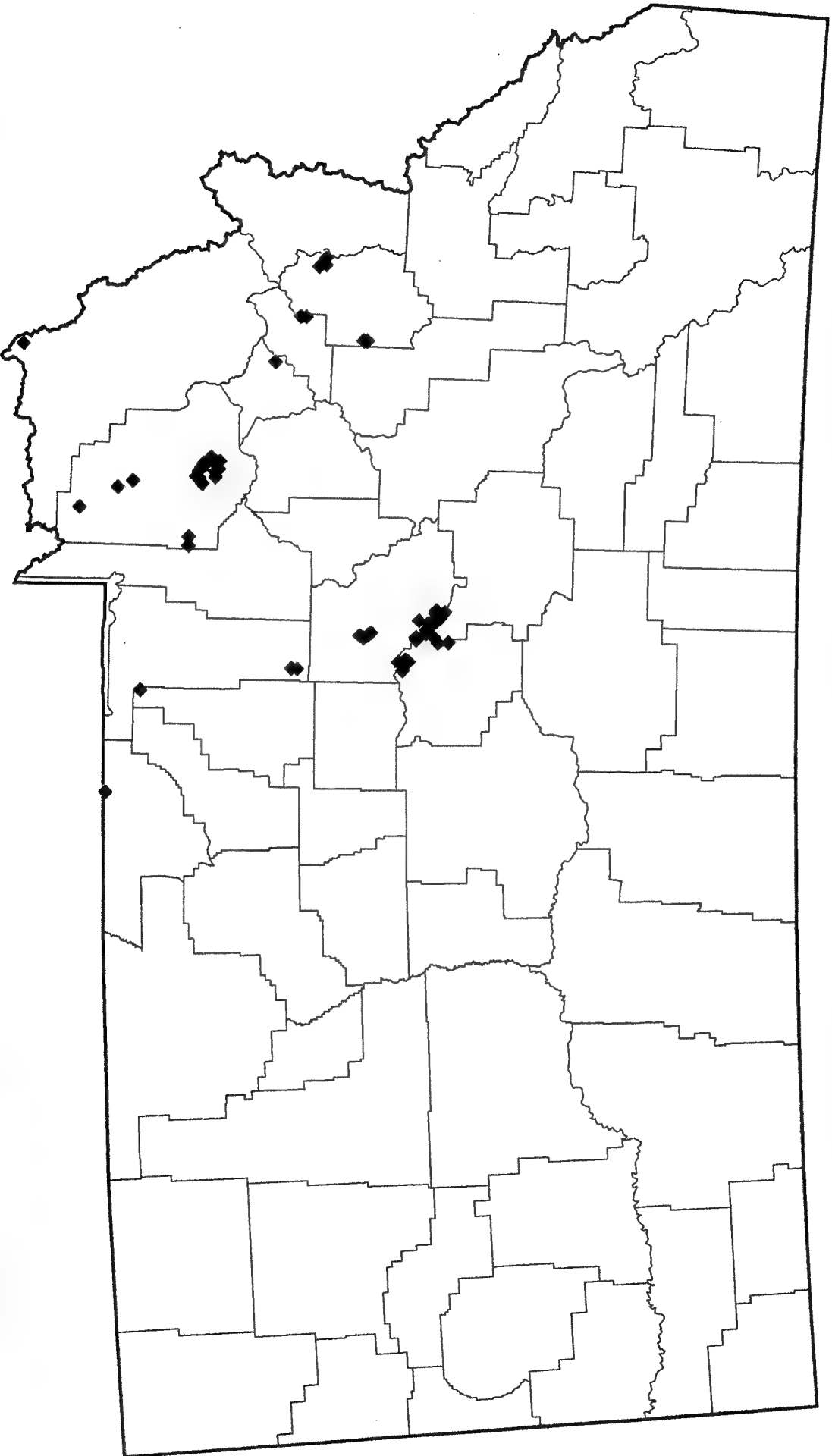
2. **Montana distribution:** In 1990 (Pavek and Schassberger), the newly described *Agoseris lackschewitzii* was known from 16 sites in Montana, but to date it is known from 62 occurrences in the state in the Absaroka-Beartooth, Anaconda, Beaverhead, Castle, Crazy, Flint Creek, Gravelly, Little Belt, Madison, Sapphire, and Tobacco Root mountain ranges. These span Beaverhead, Carbon, Cascade, Deer Lodge, Granite, Judith Basin, Madison, Meagher, Park, Silver Bow, and Sweet Grass counties. Figure 5 is a map showing the current known Montana distribution of the species. About 1/2 of these occurrences are in the vicinity of the Little Belt Mountains on the Lewis and Clark National Forest.
3. **Occurrences in the study area:** Prior to this survey, there were 4 populations of *Agoseris lackschewitzii* documented in the Tobacco Roots. Two of these are represented by "additional specimens examined" in the article containing the original description of the species (Henderson et al. 1990). Three of the four known occurrences were revisited and 10 more were found during this project for a total of 14. The populations occur on both the Beaverhead National Forest (12 occurrences) and the Deerlodge National Forest (2 occurrences). Element Occurrence Records and topographic maps showing precise locations for each population are included in Appendix C.

D. Habitat

1. **Associated vegetation:** *Agoseris lackschewitzii* grows in wet meadows and meadow/forest ecotones in the montane and subalpine zones. Typically, the habitats are dominated by sedges, grasses and willows. In the Lewis & Clark National Forest it is consistently found within Land Type II, a general setting dominated by *Abies lasiocarpa* and *Calamagrostis canadensis* (Phillips, pers. commun.). In the Tobacco Roots, the dominant sedges include *Carex aquatilis*, *C. nebrascensis*, *C. praegracilis*, *C. utriculata* and at least one site, *C. neurophora*, a species of special concern treated in detail in this report. The dominant grasses are *Calamagrostis canadensis*, *Deschampsia caespitosa*, and *Trisetum wolfii*. The willows include *Salix eastwoodiae*, *S. lemmonii*, *S. planifolia*, and *S. wolfii*. In ecotonal habitats, the associated tree species is usually *Picea engelmannii*, but at one site ("pothole basin") the *Agoseris* grows in a wet opening in forest with *Pinus contorta*. Characteristic associated forbs in these habitats include *Caltha leptosepala*, *Erigeron peregrinus*, *Pedicularis groenlandica*, *Polygonum bistortoides*, *Senecio triangularis*,

Figure 5

Distribution of *Agoseris jackschewitzii* in Montana



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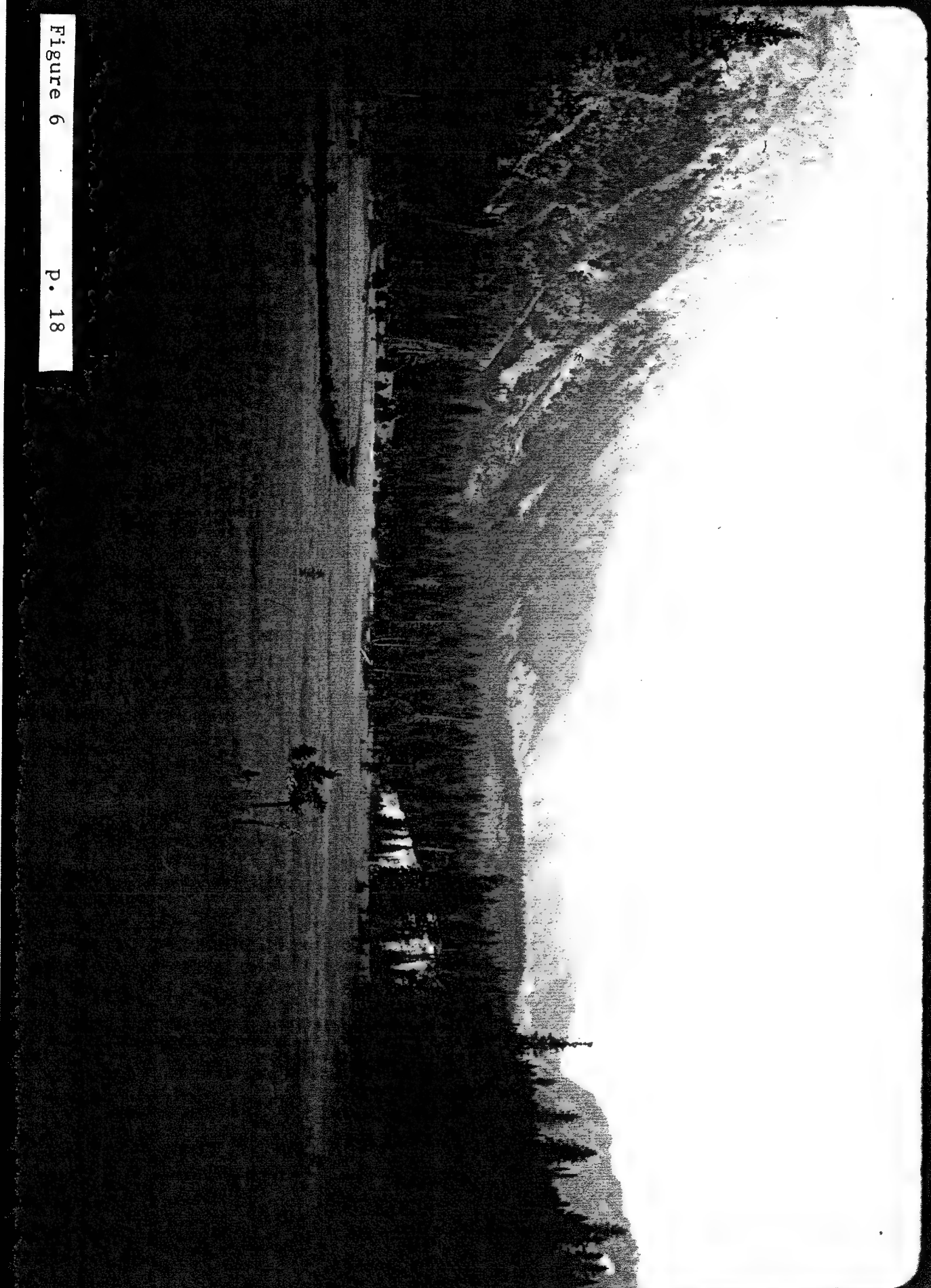
and *Trollius laxus*. Additional associates are listed on the individual Element Occurrence Records in Appendix C. Sites with *Agoseris lackschewitzii* are generally taken to represent relatively undisturbed habitats of high species diversity (W. Phillips, pers. commun.). Figure 6 is a photograph showing the habitat of *Agoseris lackschewitzii*, centrally located in the large meadow below Lost Cabin Lake.

2. **Topography:** *Agoseris lackschewitzii* is almost always found in valley bottom topographic positions at sites with little or no slope. In the Tobacco Roots, most populations are in glaciated valley bottoms and basins. The elevation range of the sites is from 2,027 to 2,850 meters (6,650 to 9,350 feet).
3. **Soil relationships:** *Agoseris lackschewitzii* grows in soils which are generally saturated throughout the growing season (aquic moisture regime). There is usually a thick layer of relatively undecomposed organic matter at the soil surface (histic epipedon), and a hard impervious bedrock. This represents a restricted set of soil conditions, amending previous statements about its lack of substrate specificity (Pavek and Shassberger 1990). In the Tobacco Roots, the soils are derived from granite, gneiss, and glacial till parent materials. Throughout Montana, the soils where the species grows are mostly reported as derived from granite or gneiss, however a few populations occur in soils derived from basalt, quartzite, and shale. The species does not seem to grow in soils derived from calcareous parent materials despite the extensiveness of calcareous bedrock in parts of its range (Henderson et al. 1990, Phillips, pers. commun., and Montana records).

E. Population demographics and biology

1. **Demographic details:** The populations of *Agoseris lackschewitzii* in Montana tend to have few individuals and cover small areas in a patchy distribution pattern representing a fraction of total wet meadow habitat. Population estimates for this species usually represent flowering stem counts. Since individual plants (genets) may have multiple flowering stems (ramets), population size may thus be overestimated. However, vegetative rosettes are not usually reported for this species due to their low stature and inconspicuousness in dense vegetation, and their numbers may be significant depending on the site and year (Pavek and Schassberger 1990), leading to underestimates of population size. Considering the caudex form, stems that are more than 5 cm apart are likely to represent individual plants. Because of these factors, the numbers given here should be considered relative approximations of population size. Almost all population estimates are fewer than 100, but a few are over 1,000. The largest reported population in the state, in the Little Belt Mountains, had an estimated 7,500 to 10,000 flowering stems and covered 30 acres. Estimates

Figure 6
p. 18



of population size in the Tobacco Roots range from more than 1 to over 1,000 flowering stems occupying from 0.2 to 20 hectares (0.5 to 50 acres); most are less than 100 stems over less than a half of a hectare (< 1 acre). The largest population observed in the study area, both in numbers and area, is the Noble Lake occurrence (053). The highest plant densities observed were at Noble Lake and McKelvy Lake (003).

2. **Reproductive biology:** Reproduction is by seed. Seed dispersal is facilitated by the double pappus which remains attached to the achene at maturity allowing the seed to be carried by wind currents, in the same manner as dandelions.

A few browsed heads were observed in the Tobacco Root populations. Herbivory of heads by cattle, sheep, deer, elk, and birds has also been noted elsewhere in the state. The impact of grazing on reproduction of *Agoseris lackschewitzii* is not known. Only a few plants were seen in heavily grazed habitat in 1994 but browsed plants would not be conspicuous. A population site at Mill Creek (032) described in 1992 as having "evidence of heavy livestock grazing" was revisited in 1994; the habitat was in relatively good shape with no evidence of recent grazing but the population consisted of relatively few (around 50) widely scattered plants.

F. Management concerns:

Populations of *Agoseris lackschewitzii* in the Tobacco Roots are potentially threatened by cattle grazing, off road vehicle use, weed infestations, and water development projects. Cattle grazing is probably the most immediate threat. Although quantitative data is lacking on the impact of grazing on population numbers, the largest populations occur in more pristine habitat at the heads of drainages (Noble Lake, 053, and McKelvy Lake, 003). The ecological effects of heavy grazing were observed at one population site (Hollowtop Mountain, 049) which was grazed earlier in the season: the ground was heavily trampled and stream banks eroded and the ground where a few small plants of *A. lackschewitzii* were found was unusually dry for the species. Besides degrading wetland habitat, cattle probably impact populations and migration of the species by browsing flower heads in late summer. Four wheel drive and all terrain vehicle use is prevalent in the Tobacco Roots. Off road vehicle travel is generally prohibited where *A. lackschewitzii* grows, but illicit vehicle tracks were seen within population areas (McKelvey Lake, 003 and Macaroni Lake, 050); the wet soils at the sites are easily compacted and rutted. Cattle and vehicles may also degrade habitat by transporting seeds of exotic species and creating disturbances which are ideal for weed establishment. Infestations of exotic plants (dandelions and Kentucky bluegrass) were reported at population sites of *A. lackschewitzii* in the Beaverhead and Madison Ranges. Wetlands at higher elevations in the Tobacco Roots are not generally weedy, but adjacent drier

slopes often are, and weed taxa adapted to wet habitats may appear in the future. One subpopulation at the Jackson Lake site (051) is located in a wetland near what is mapped as Ziegler Reservoir (U.S.D.A. Forest Service 1981, 1990). Impoundment at the site was not observed at the survey date and the exact location of the reservoir and its current status is not known. Nearly all of the mountain lakes in the Tobacco Roots have had their levels raised by man-made impoundments, potentially impacting wetland habitat around the lakes and downstream.

Agoseris lackschewitzii is now known from 62 sites in Montana, but most populations are small and occur in habitats which are impacted or potentially impacted by cattle grazing, thus U.S. Forest Service Sensitive status remains appropriate at this time. Additional research is needed to determine trends in population numbers and levels of grazing to which the species is resistant. It has been suggested that the species has value as an indicator of range quality of montane and sub-alpine wet meadows (W. Phillips, pers. commun.). In the Lewis and Clark National Forest, populations of *A. lackschewitzii* have been included in Research Natural Areas but populations in other National Forests throughout the range of the species are not protected by similar designations. In conclusion, a conservation strategy to insure the security of the species in its present numbers throughout its range is needed before a change in U.S. Forest Service sensitive status is appropriate to recommend.

Carex neurophora Mackenzie
Alpine Nerved Sedge

A. Description

1. **General description:** *Carex neurophora* is an herbaceous perennial sedge (Cyperaceae) that grows in tufts from shortly elongated rootstocks. The leaf blades are flat, but the lower leaf sheaths are bladeless, so that the leaves do not appear to be clustered at the base of the plant. The sheaths are usually conspicuously cross rugulose (a potentially useful vegetative character). The heads are compact and are composed of several unstalked spikes, which are, however, difficult to discern without magnification. The spikes have male flowers above the female flowers. The female flowers have 2 stigmas and the achenes are lens shaped. The perigynia (the sacs which enclose the fruits) are gradually tapered to a beak, are needed for identification, and mature in late July and August. Figure 7 is an illustration of the plant (from Cronquist et al. 1977).
2. **Technical description** (quoted from Cronquist et al. 1977): Stems clustered, 2-8 dm tall, strongly aphyllopodic, not notably slender; leaves flat or nearly so, 1.5-3 mm wide, all borne on the lower part of the stem, but not forming a close cluster; ventral side of the leaf sheaths pale (often with darker veins), usually rather conspicuously cross-corrugate especially distally, and commonly convex or prolonged (and often cartilaginous) at the mouth, occasionally some or all of the sheaths plane instead of corrugated; spikes individually small, few flowered, androgynous, and sessile, more or less numerous in a usually compound, thick-cylindric to broadly ovoid head that is 10-25 mm long and 6-15 mm thick, the individual spikes scarcely distinguishable; bracts small, sheathless, and inconspicuous, often scarcely larger than the pistillate scales, these largely hyaline-scarious and brownish or brownish-stramineous, equaling or somewhat smaller than the perigynia; perigynia commonly shining brown-stramineous, lance-triangular, often rather broadly so, mostly 2.9-3.8 mm long and barely if at all over 1 mm wide, tapering evenly from base to apex, or a little more abruptly narrowed above the middle, the beak obliquely cleft and shortly or scarcely bidentate, often ill-defined; body of the perigynium somewhat spongy at the base, several-nerved dorsally, few-nerved ventrally, or the ventral nerves seldom obscure; stigmas 2; achenes lenticular, 1.1-1.3 mm long, jointed to the style.

3. Diagnostic characters: *Carex neurophora* is a member of the largest genus found in the study area (30+ species). Reliable identification of sedges depends on evaluation of a number of correlated, often minute technical characters, and mature plants with fruiting material are usually required. The following characters can be used to separate *Carex neurophora* from other sedges in Montana (adapted from Dorn 1984 and Hermann 1970):

- stems caespitose, not from rhizomes
- leaves not densely clustered near base (lower sheaths without blades), sheaths usually cross rugulose
- spikes several, in simple heads, sessile, with male flowers above the female (androgynous)
- stigmas 2, achenes lenticular
- perigynia 3-4 mm long, tapered gradually to a beak which is shorter than the body

B. Present legal or other formal status

1. Federal

a. U.S. Fish and Wildlife Service: none

b. U.S. Forest Service: none

2. State: The Montana Natural Heritage Program ranks *Carex neurophora* G4 and S1 (Heidel 1994). This means that the species is apparently secure globally, but is critically imperiled in Montana due to extreme rarity.

C. Geographic distribution

- 1. Species range:** From the Cascade Range in Washington and Oregon across northern and central Idaho to southwestern Montana, south across Wyoming to northern Colorado and Utah (Cronquist et al. 1977).
- 2. Montana distribution:** Before 1994, *Carex neurophora* was reported from six sites in the Absaroka, Anaconda, Bitterroot, Flint Creek, and Sapphire mountains in Park, Deer Lodge, Missoula, Granite, and Ravalli counties respectively. The two sites in the Absarokas are based on relatively old collections (1945 and 1947). All of the sites are in or adjacent to National Forests, but the Tobacco Root Mountain collections represent the first ones made on Beaverhead National Forest. Figure 8 shows the Montana distribution of the species.
- 3. Occurrences in the study area:** Although it was not previously reported from the range and had not been identified as a target for this project, *Carex neurophora* was collected three times in the Tobacco Roots in the Beaverhead National Forest. The sites are along upper

Figure 7



C. neurophora

From: Hitchcock et al. 1984

Wisconsin Creek near Jackson Lake (009) on the western flank of the range, and in the basins of Mason (008) and Twin Lakes (007) on the eastern flank. The specimens were identified in the herbarium after the field season, thus the populations were not fully surveyed, but notes on habitat and relative abundance were taken in most cases. Element Occurrence Records (EORs) and maps showing precise locations of the populations are given in Appendix C.

D. Habitat

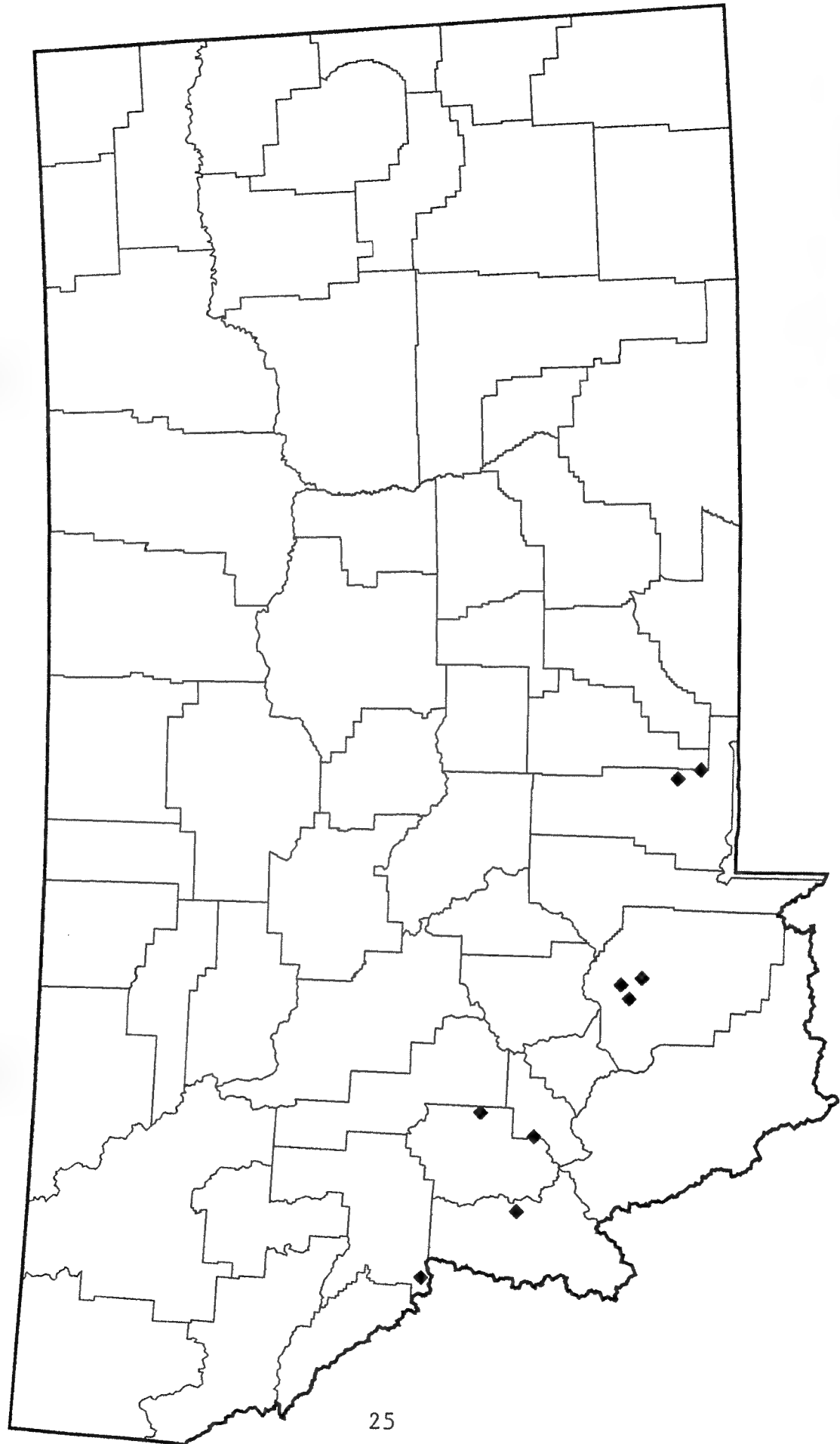
1. **Associated vegetation:** In the Tobacco Roots, *Carex neurophora* was found in wet meadow/willow thicket habitat types. At two sites, the sensitive plant *Agoseris lackschewitzii* was also found, thus much of the information on habitat given in this report for that species also applies to this sedge. The willow species at the population sites are *Salix planifolia* and *S. wolfii*. Subdominant graminoids include *Deschampsia caespitosa* and other species of *Carex*. Two of the sites have scattered Engelmann spruce. The extensive wetland community at Mason Lake (008) is distinctive, with the willows sharing dominance with *Potentilla fruticosa*. More complete lists of associated plants are given in the general site description fields of the EORs for the individual populations in Appendix C. Figure 9 is a photograph showing the habitat of *Carex neurophora* (and *Agoseris lackschewitzii*) near Jackson Lake (009).
2. **Topography:** The population sites in the Tobacco Roots are a glaciated valley bottom (Jackson Lake, 009) and morainal lake basins at 2,530 to 2,545 meters (8,300 to 8,350 feet). The Mason Lake (008) wetland is on a gentle slope; the other sites have nearly level bottom positions.
3. **Soil relations:** The soils at all three population sites are saturated throughout the growing season and have histic epipedons. They were derived from gneiss and glacial till.

E. Population demographics and biology

1. **Demographic details:** Numerical estimates of population size are lacking for all occurrences of *Carex neurophora* in Montana, including those in the study area, however, at three of the previously known sites, the plant was reported as "common." In the Tobacco Roots, the species was considered locally subdominant at the Jackson Lake site (009), but the aerial extent of this association was not determined. At Mason Lake (008) only a few flowering plants could be found despite extensive wetland habitat; vegetative plants were not recognized at the date of the survey. Estimates of relative abundance are not available for the Twin Lakes population (007).

Figure 8

Distribution of *Carex neurophora* in Montana



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- 2. Reproductive biology:** Reproduction of this sedge is by seed. Mature fruit were collected from all populations of the species in the Tobacco Roots. Levels of seed production were very high at Jackson Lake (009) but very low at Mason Lake (008). The Mason Lake wetland was notable because very few plants of any species were in flower or fruit. The site was grazed earlier in the season and most plants apparently did not have time or resources for reproduction in 1994, although vegetative regrowth had occurred.

F. Management Considerations

Occurrences of *Carex neurophora* in the Tobacco Roots face the same potential threats outlined in this report for *Agoseris lackschewitzii*. The populations at Jackson and Twin Lakes (007 and 009) were in habitat in good condition, but the population site at Mason Lake (008) was heavily impacted by cattle grazing in 1994. Early season grazing interfered with seed production of nearly all herbaceous species at this site. The size of the population and the impact of grazing on its long term viability can not be determined at this point. *Carex neurophora* has been reported to be an indicator of good range condition (Hermann 1970).

Carex neurophora is a poorly understood species in Montana. At several sites it was considered common and at one site in the Tobacco Roots it was considered the subdominant graminoid of the community. Sedges, in general, are often overlooked because they are difficult to identify, or not identifiable at early dates in the season. Among sedges, *C. neurophora* is not especially distinctive and superficially resembles many other species. It is likely that it is more common than is currently documented but this remains to be proven. In order to encourage collection of additional data on its Montana distribution and numbers, and its response to grazing, we recommend that *Carex neurophora* be designated a Watch species by the Beaverhead and Deerlodge National Forests. The species is currently known from the Deerlodge National Forest in the Anaconda and Flint Creek Range. With nine occurrences now known in Montana, all but two recently, changing its Montana Natural Heritage Program state rank from S1 to S2 is appropriate.

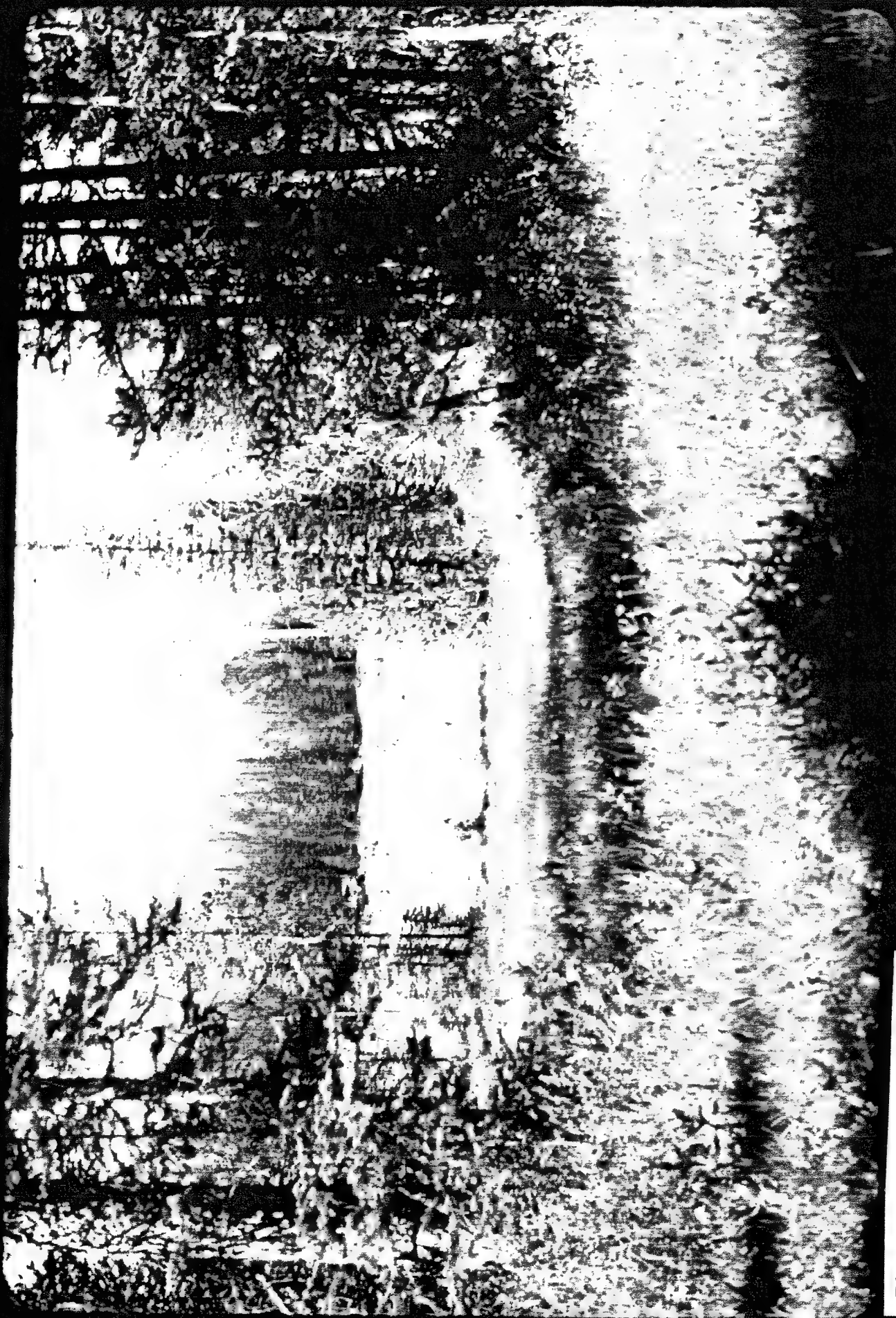


Figure 9

Castilleja gracillima Rydberg
Slender Paintbrush

Family: Scophulariaceae (Figwort Family)

Diagnostic characters: Rhizomatous, stems tall, inflorescence yellow to orange to red to purple, galea < 1/2 the length of the corolla tube (Hitchcock and Cronquist 1973).

Current legal or other formal status: U.S.F.S. Region 1 sensitive (USDA Forest Service 1994a), Montana Natural Heritage Program G3G4 S1 (Heidel 1994).

Geographic distribution: Central Idaho to southwestern Montana and adjacent Wyoming (Hitchcock and Cronquist 1973). In Montana, verified occurrences are known only from the upper Madison and Gallatin River drainages in Gallatin County. Two alleged historical collections were taken from the vicinity of the Tobacco Roots, however their identity as *Castilleja gracillima* is doubtful; one (Metcalf, H. N. s.n., 1949, MONT accession # 41385) was identified as *C. miniata* by Sarah Mathews, a student of the genus, and the other (Fitch s.n., 1892, MONT accession # 2769) was not determinable due to the poor condition of the specimen. Rhizomatous, yellowish paintbrushes collected during this project along Mill Creek (west of Sheridan) were also identified by Mathews as *Castilleja miniata*, having galeas too long for *Castilleja gracillima*.

Habitat: Saturated soils, along willow lined stream courses in sagebrush grassland settings.

Comments: Rhizomatous, yellowish forms of *Castilleja miniata* resemble *Castilleja gracillima*, but have longer galeas (Mathews pers. commun.). These forms occur in wet habitats with willows, and have been collected from several locations in southwestern Montana, including the Tobacco Roots. It seems that *Castilleja gracillima* is confined in Montana to the upper reaches of the Gallatin and Madison Rivers. The undeterminable collection from near Sheridan is probably *Castilleja miniata*, judging from this project's collections from the area (Vanderhorst # 5260, will be deposited at MONT). The dubious collection record is represented in Appendix C. Further information on *Castilleja gracillima* can be found in Mathews (1989).

Delphinium bicolor Nuttall ssp. novum
Limestone Larkspur

A. DESCRIPTION

1. **General description:** This larkspur, in the Buttercup Family (Ranunculaceae), has been identified in the past as *Delphinium andersonii* or *Delphinium geyeri* (e.g. Lesica and Achuff 1992, Poole and Heidel 1993). Herbarium work has shown that Montana plants are not closely aligned with either of these taxa but are more closely related to *Delphinium bicolor*. A specialist in the genus, Michael Warnock (Sam Houston State University, Huntsville, Texas), was consulted and a new taxon will be described as a subspecies of *Delphinium bicolor*. The plants are perennials with relatively strong deep roots. The deeply palmately cleft leaves are mostly basal and are nearly hairless to fairly densely hairy. The large, showy blue flowers are borne on long, spreading pedicels and form a relatively broad, pyramidal inflorescence. The flowers are strongly irregular, with 5 large sepals which are flared in front; the upper one is prominently spurred in back. There are two pairs of smaller and comparatively inconspicuous petals, the upper are blue tipped (sometimes solid white) without pigmented veins. There are usually 3 pistils, which develop into follicles (dry, many seeded fruits which split down one side). Flowers are needed for positive identification, and the flowering period is May through early June. Figure 10 is a photograph of the plant.
2. **Technical description:** not yet available.
3. **Diagnostic characters:** These plants are geographically sympatric to *Delphinium bicolor* ssp. *bicolor*, which they resemble. The key distinction in the field is the upper petals, which are blue tipped or solid white, in contrast to the blue veined petals of the nominate subspecies. In addition, the flowers are somewhat larger, the sepals are brighter blue, and the lower petals are more deeply cleft (Warnock, pers. commun.). There also seems to be subtle differences in phenology, *Delphinium bicolor* ssp. *bicolor* being earlier to flower when the two taxa were growing in the same vicinity (Vanderhorst pers. obs.). *Delphinium bicolor* ssp. *bicolor* was also seen in the Tobacco Roots and has a broad distribution in Montana in many habitats; other larkspurs seen in the study area are tall plants which grow in wetter areas and bloom later in the season.

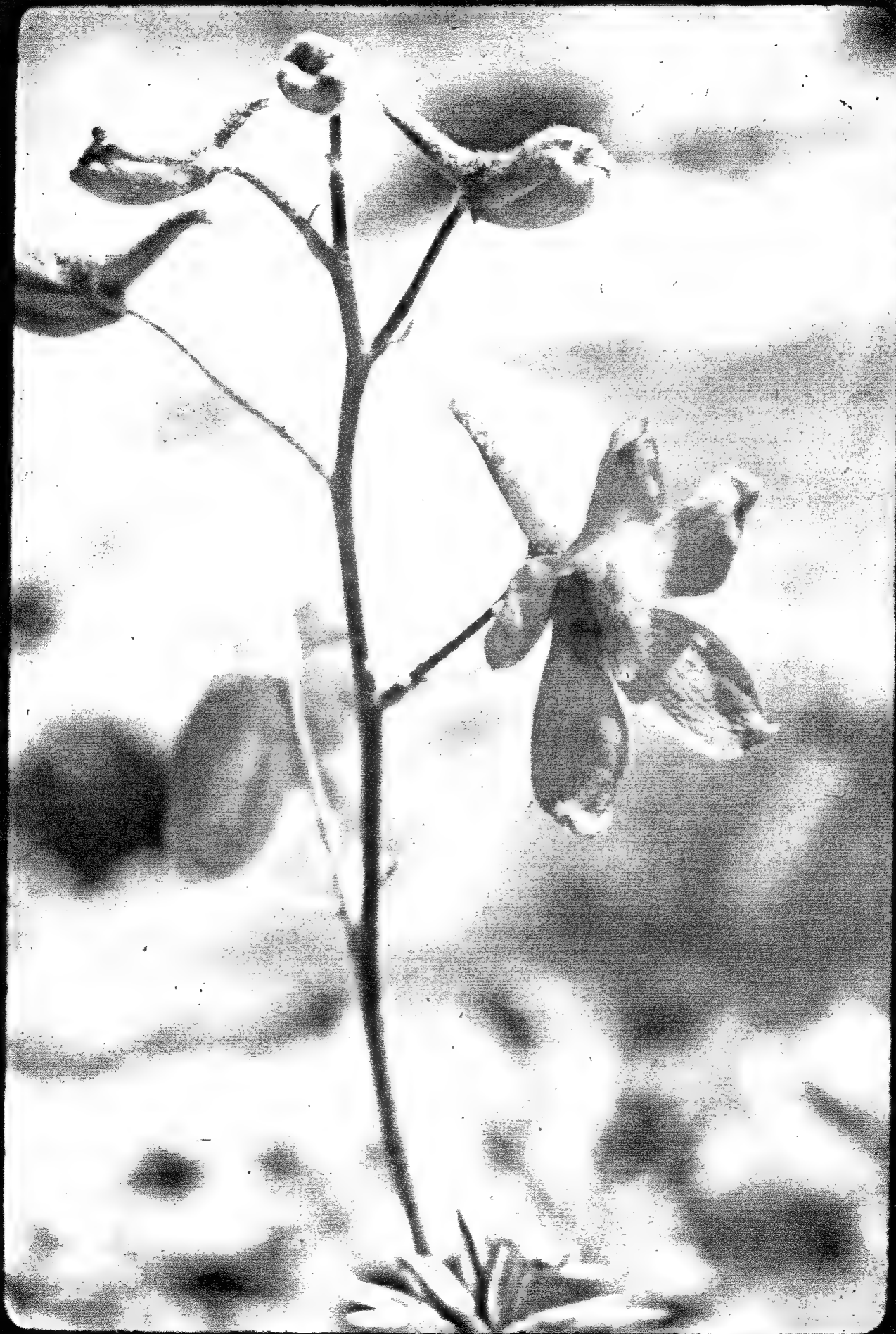


Figure 10

B. Current legal or other formal status

1. Federal

a. U.S. Fish and Wildlife Service: none

b. U.S. Forest Service: none

2. **State:** The Montana Natural Heritage Program ranks *Delphinium bicolor* ssp. novum as G3 and S3 (Heidel 1994). This is an indication that the taxon has a restricted range. Global and state rank are the same because the taxon is known only from Montana.

C. Geographic distribution

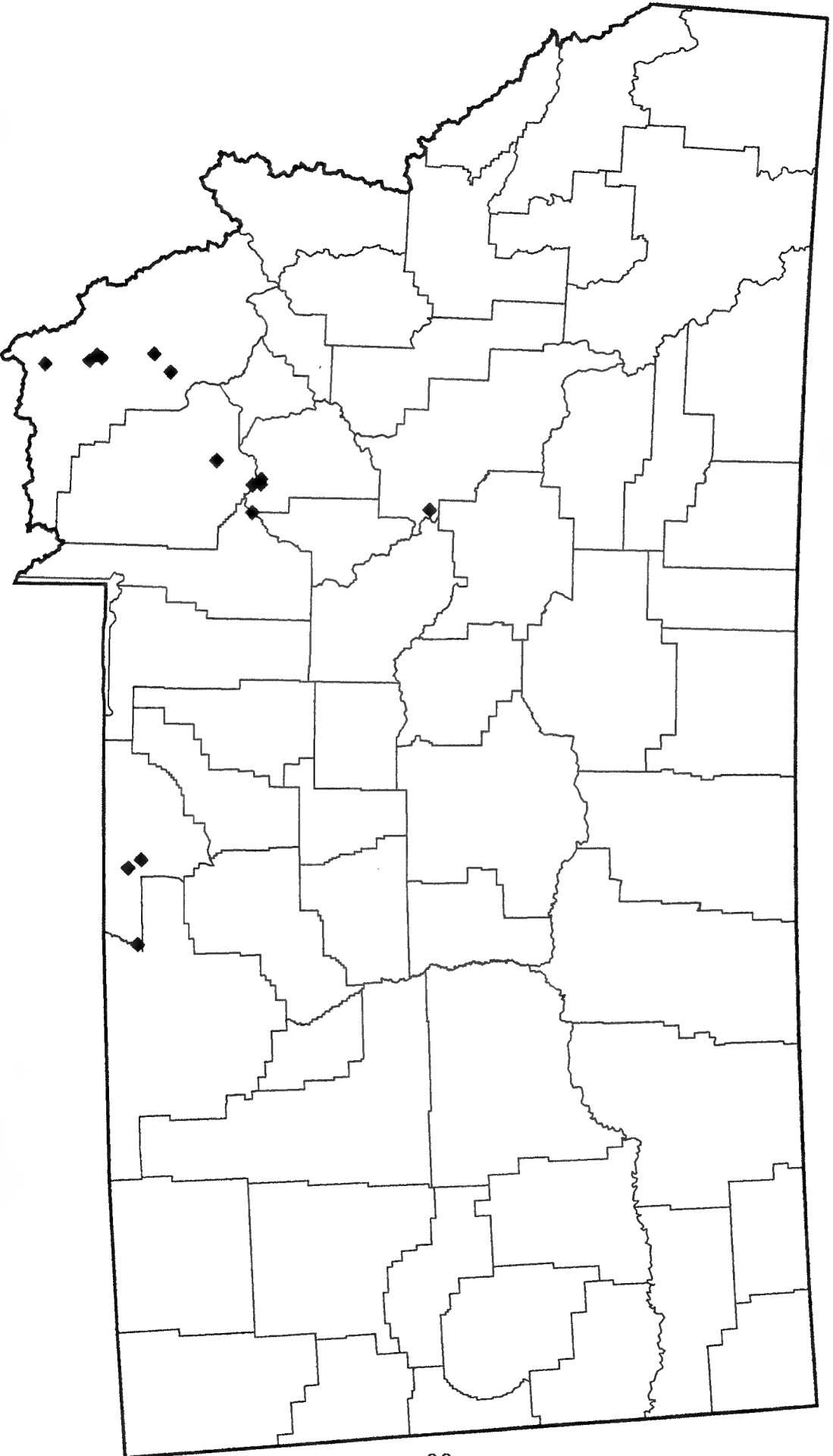
1. **Species range:** This undescribed taxon is apparently endemic to southwestern and south central Montana (Figure 11).
2. **Montana distribution:** Prior to this project, the taxon was collected from the foothills of the Tendoy and Pioneer Mountains (Beaverhead County), the Jefferson River drainage (Broadwater and Jefferson Counties), the Rattlesnake Hills (Gallatin County), the Big Belt Mountains (Lewis and Clark County), and the Pryor Mountain desert (Carbon County). The collection made in 1994 represents the first one from the Deerlodge National Forest in particular and national forests in general. Figure 11 is a map showing the distribution of the taxon in Montana.
3. **Occurrences in the Tobacco Roots:** *Delphinium bicolor* ssp. novum was found once in the Deerlodge National Forest in Bone Basin in the northwestern part of the range. This is the first known record from Madison County.

C. Habitat

1. **Associated vegetation:** Throughout its range, Limestone Larkspur occurs mostly in sparsely vegetated microhabitats within sagebrush grasslands (most commonly *Artemisia tridentata*/*Elymus spicatus* habitat types) and mountain mahogany (*Cercocarpus ledifolius*) communities. Immediate associates are usually other limestone adapted species; outside of this study area these include other Montana plant species of special concern, such as *Lomatium attenuatum*, *Sphaeromeria argentea*, and an undescribed *Lesquerella* (Vanderhorst 1995, Vanderhorst and Lesica 1994). The Bone Basin occurrence in the Tobacco Roots is in an *Artemisia tridentata*/*Elymus spicatus* habitat type with other associates including *Artemisia ludoviciana*, *Koeleria macrantha*, and *Vicia americana*. The typic subspecies of *Delphinium bicolor* was found on the north-facing slope of the same ridge. Figure 12 is a photograph of the habitat at Bone Basin where it occurs scattered in a band of xeric vegetation.

Figure 11

Distribution of *Delphinium bicolor* ssp *novum* in Montana



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2. **Topography:** *Delphinium bicolor* ssp. novum grows on unglaciated ridges, slopes, rockslides, and banks in the foothills and basins at elevations ranging from 1,250 to 2,173 meters (4,100-6,800 feet) in a variety of slope positions. At the north end of the Tobacco Roots, it is scattered intermittently at an exposed midslope position.
3. **Soil relations:** The taxon is confined to soils and lithic substrates derived from calcareous parent materials. In the Tendoy Mountains these are shallow, gravelly, fine textured soils on top of limestone bedrock. Along the Jefferson River they are loose, rich soils. In the Pryor Mountain Desert they include dry, calcareous sands, and in the Big Belt Mountains the plant grows in loose limestone talus. These soils are usually moist only in the spring and early summer when the plants are actively growing.

E. Population demography and biology

1. **Demographic details:** The occurrences in Montana range from a single plant to thousands of plants covering hundreds of hectares. The distribution in many areas is more or less continuous over appropriate limestone habitat. The population in Bone Basin consisted of over 50 plants covering 0.4 hectares (1 acre), with additional potential habitat adjoining which was not surveyed.
2. **Reproductive biology:** Reproduction is by seed. Mature fruit have been noted at only a few sites in the state, however, this is because the taxon has been surveyed only at early dates; without flowers, *Delphinium bicolor* ssp. novum would not be distinguishable from the nominate subspecies, at least given current knowledge of the taxon. Many populations, including the one in Bone Basin, have a large proportion of vegetative plants (presumably juvenile), which is taken as an indication of successful reproduction and seedling establishment. Although larkspur species are known to hybridize, no intermediates between the subspecies have been seen, even when the two taxa were growing close together.

F. Management concerns

Recent studies in Montana have shown that what was previously tracked as two separate species (*Delphinium andersonii* and *Delphinium geyeri*) is better classified as one taxon which will be described as a subspecies of *Delphinium bicolor* (M. Warnock, in progress). In addition, many new populations of the taxon have been recently discovered and its distribution in many areas has been found to be more or less continuous over large areas of suitable habitat. The taxon is, thus, now known to be much more common than was thought just a couple of years ago. Populations seem to respond well to grazing; at one site near Doherty Mountain, in Jefferson County, a population which straddled a fenceline was more dense on the heavily grazed side (Vanderhorst



1994), and flourishing populations have been observed elsewhere in grazed habitat. Other populations occur in secondary range. Species of *Delphinium* are known to be toxic to cattle. It now seems that management for conservation of Limestone larkspur is not necessary and no special U.S. Forest Service status is proposed. The taxon does have significance to Montana because it is endemic to the state and is a very attractive plant. However, because it is quite common and apparently not vulnerable to extinction in any way, *Delphinium bicolor* ssp. novum will no longer be actively tracked by the Montana Natural Heritage Program. An expanded species status report is in progress (Heidel 1995).

Eleocharis rostellata (Torrey) Torrey
Beaked Spikerush

A. Description

1. **General description:** This spikerush, in the sedge family (Cyperaceae), is most easily distinguished by its mode of vegetative reproduction via apical bulbils which root when the stems touch the ground; this feature, however, is not always apparent. The plants are perennials which grow from erect rhizomes. The stems are flattened with no apparent leaves (these are reduced to sheaths). The inflorescence is a compact single spike with scales covering the flowers and fruits. The flowers have 3 stigmas. The fruit, an achene, has a beak (or tubercle) which is attached to the body without a constriction separating them. Mature fruit, which is needed for positive identification, was presumably present at the dates of all Montana collections (early July to September).
2. **Technical Species description** (quoted from Cronquist et al. 1977): Perennial with clustered stems on short, stout, often ascending or nearly vertical rhizomes; culms (2)4-10 dm tall or sometimes more, more or less flattened at least distally and commonly 1-2 mm wide, some of them commonly proliferous (rooting from an apical bulbil); spikelets (5)8-13 mm long, (5)10- to 20- (25)-flowered; scales equaling or surpassing the achene; stigmas 3; achene light greenish to medium brown, rounded-trigonous to planoconvex, smooth and shining or slightly cellular roughened, 1.9-2.8 mm long, including the prominent, pale tubercle which is up to 0.75 mm long and is confluent with the body of the achene.
3. **Diagnostic characters:** *Eleocharis rostellata* can be separated from all other species in the genus in Montana by combining flowers with 3 stigmas, an achene with the tubercle confluent with the body, and flattened culms (Dorn 1984).

B. Current legal or other formal status

1. Federal

a. U.S. Fish and Wildlife Service: none

b. U.S. Forest Service: none

2. State: The Montana Natural Heritage Program ranks *Eleocharis rostellata* G5 and S1 (Heidel 1994), meaning that it is demonstrably secure globally but is critically imperiled due to extreme rarity in Montana.

C. Geographic distribution

1. Range of the species: Vancouver Island to Nova Scotia south to the Greater Antilles and northern Mexico, also in the Andes in South America (Cronquist et al. 1977)

2. Montana distribution: *Eleocharis rostellata* is known from 8 sites mainly in the western part of the state, in Flathead, Lake, Madison, Sanders, Teton and Carbon counties. Two of the occurrences are based on very early collections (1861 and 1908). Three of the modern collections are from Madison County. Figure 13 is a map showing the Montana distribution of this species.

3. Occurrences in the Tobacco Roots: The species was discovered and surveyed in 1990 by Peter Lesica on private land at Potosi Hot Springs (element occurrence 004). The population was not revisited by this project except by driving past. An Element Occurrence Record and map showing the precise location of the population is given in Appendix C. Another possible occurrence in the Tobacco Roots is on the Beaverhead National Forest at the Leonard Creek Fen; vegetative plants which appeared to be a flat stemmed *Eleocharis* were locally abundant here, but no flowers, fruit, or stolons could be found. Followup investigation is warranted.

D. Habitat

1. Associated vegetation: *Eleocharis rostellata* grows in open wetland plant communities, often around hot springs or in fens. Associated graminoids at these sites in Montana include *Deschampsia cespitosa*, *Eleocharis palustris*, *Juncus balticus*, *Scirpus cespitosus*, *Triglochin maritimum* and species of *Carex* (*C. flava*, *C. livida*, *C. oederi* and *C. simulata*). Associated forbs include *Mimulus guttatus*, *Parnassia parviflora*, and *Spiranthes romanzoffiana*. At Potosi Hot Springs, *Eleocharis rostellata* was considered the dominant plant of the community.

2. Topography: In Montana, the sites are at hot springs, in fens, on travertine terraces, and on the shore of a slough.

These are nearly level sites in bottom topographic positions at low to middle elevations ranging from 823 to 1,860 meters (2,700 to 6,100 feet).

3. **Soil relations:** The soils are usually saturated and saline, alkaline, or highly calcareous. Its occurrence around hot springs is probably more influenced by water chemistry than by direct temperature effects. The soils at fens and possibly other heavily vegetated, saturated sites are histosols.

E. Population demography and biology

1. **Demographic details:** At recently surveyed populations, *Eleocharis rostellata* has been described as very local to locally abundant. In 1990, the Potosi Hot Springs population was estimated to consist of 1,001-10,000 ramets.
2. **Reproductive biology:** Reproduction is sexual, by seed, and vegetative, by stolons with bulbils. The mode of vegetative reproduction is distinctive, but not always apparent; bulbils are formed in the inflorescence, the culms bend over, touching the ground, and the bulbils root, giving rise to a new plant. Because of vegetative reproduction, it is nearly impossible to distinguish between ramets and genets.

F. Management concerns:

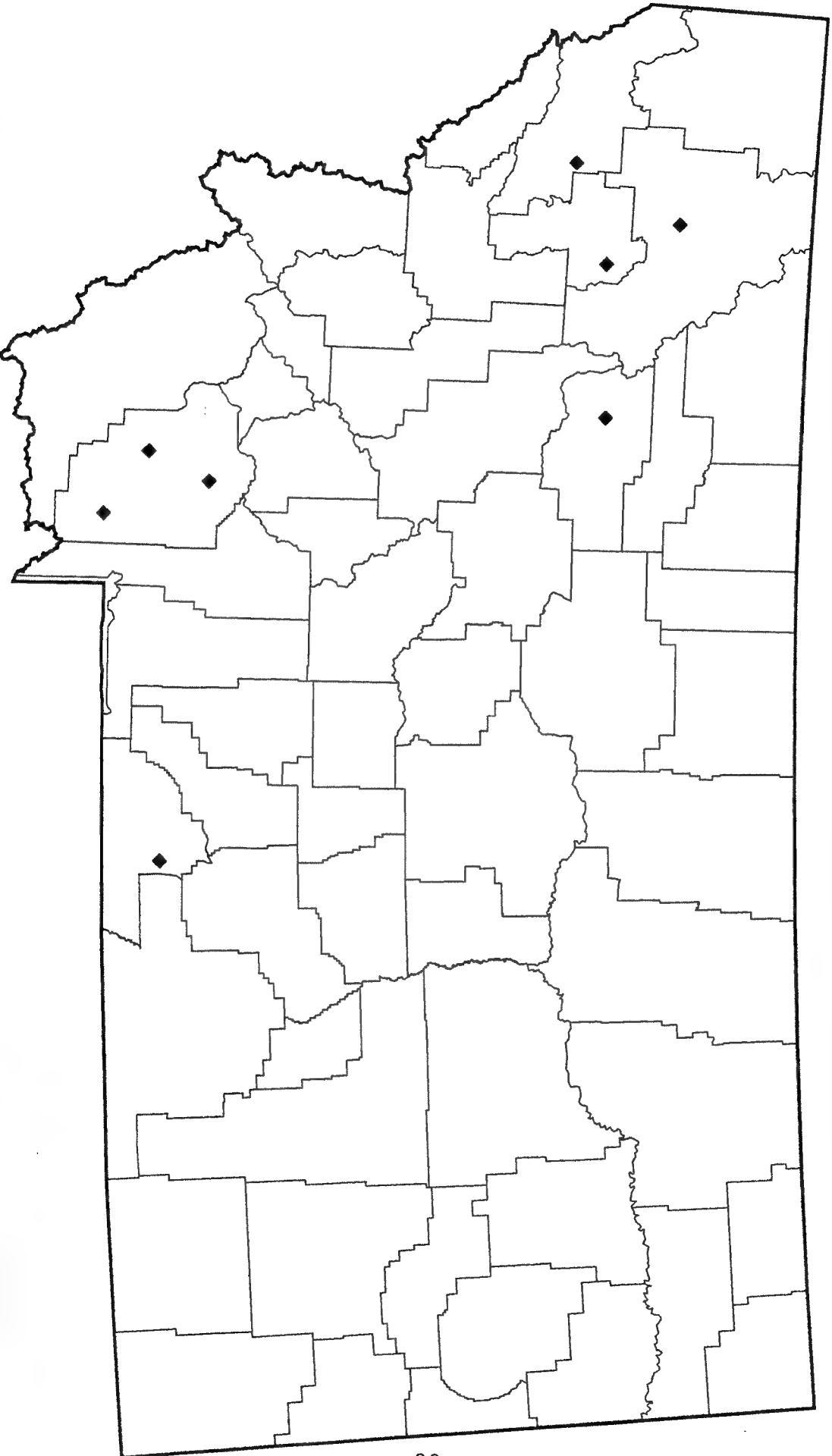
Although *Eleocharis rostellata* has not been documented on National Forest lands in the Tobacco Roots (or elsewhere in Montana), its occurrence on adjacent private land is potentially impacted by Forest Service management activities.

Eleocharis rostellata is rare and highly habitat-specific in Montana, and its habitats are small and easily disturbed. Designation as a Watch species by the Beaverhead National Forest is appropriate. Forest Service management activities adjacent to Potosi Hot Springs, such as road building and maintenance, have potential impact if they effect the drainage patterns and water chemistry of the population site.

In addition, there is a possible occurrence on the Beaverhead National Forest (Leonard Creek fen) which needs further evaluation. It appeared that water levels in the fen were very high as judging by a broad openwater "moat" around the floating peat mat and vegetation/surface water patterns of nearby wetlands. Runoff from surrounding roads and clearcuts may be significant factors. Note: This site was also found to harbor bog lemming, a sensitive animal species; see Discussion section of this report.

Figure 13

Distribution of *Eleocharis rostellata* in Montana



Epipactis gigantea Douglas ex Hooker
Giant Helleborine

A. Description

1. **General description:** This is a large, showy flowered orchid (Orchidaceae). The plants are perennials from creeping underground stems. The aerial stems are tall with sheathing, parallel veined, pleated leaves. A few to several large flowers are borne towards the top of the stems with large leaf-like bracts below them. The flowers are greenish to purplish to brownish with 3 spreading sepals, two petals similar to the sepals, and a lower petal or "lip" which is three lobed. The fruits are pendant capsules which contain many tiny seeds. The plants flower in July.
2. **Technical species description** (quoted from Cronquist et al. 1977): Stems 1 to several, from creeping rhizomes, 3-7 (10) dm high, glabrous or nearly so and becoming pubescent in the inflorescence; the lower leaves ovate, sessile, the upper becoming narrower, lanceolate to linear-lanceolate; flowers 3-9 (12), rather showy, the raceme usually secund, the long bracts becoming reduced above, the terminal one often exceeding the ovary; sepals with a greenish sheen, with brownish veins, 12-15 mm long; petals similar to the sepals but somewhat thinner, more brownish-purple; lip 15-18 mm long, the sac with raised purplish lines leading to the base, 3-lobed, with prominent outer lobes, slightly curved downward, the flattened tip with uprolled margins, greenish-yellow, the basal portion much thickened, yellow, with several crests leading into the sac; column 6-8 mm long, broadened above; capsule 2-2.5 cm long, reflexed, ovoid to ellipsoid, dark brown on the ridges and otherwise yellowish.
3. **Diagnostic characters:** The only other species of the genus in Montana, *Epipactis helleborine*, a European species which is locally naturalized in Lewis and Clark County, has smaller flowers with an unlobed lip. Giant helleborine can be distinguished from other Montana orchids by its large size and large green-brown-purple flowers in bracted racemes.

B. Current legal or other formal status

1. Federal

a. U.S. Fish and Wildlife Service: none

b. U.S. Forest Service: Sensitive in Region 1 (USDA Forest Service 1994a); "edge, disjunct, other plant" status in Region 4 (USDA Forest Service 1994b).

2. **State:** The Montana Natural Heritage Program ranks *Epipactis gigantea* G4 and S2 (Heidel 1994). This means the species is apparently secure globally, but is imperiled in Montana due

to rarity and other factors. In Wyoming the species is ranked S1 (Fertig 1994).

C. Geographic distribution

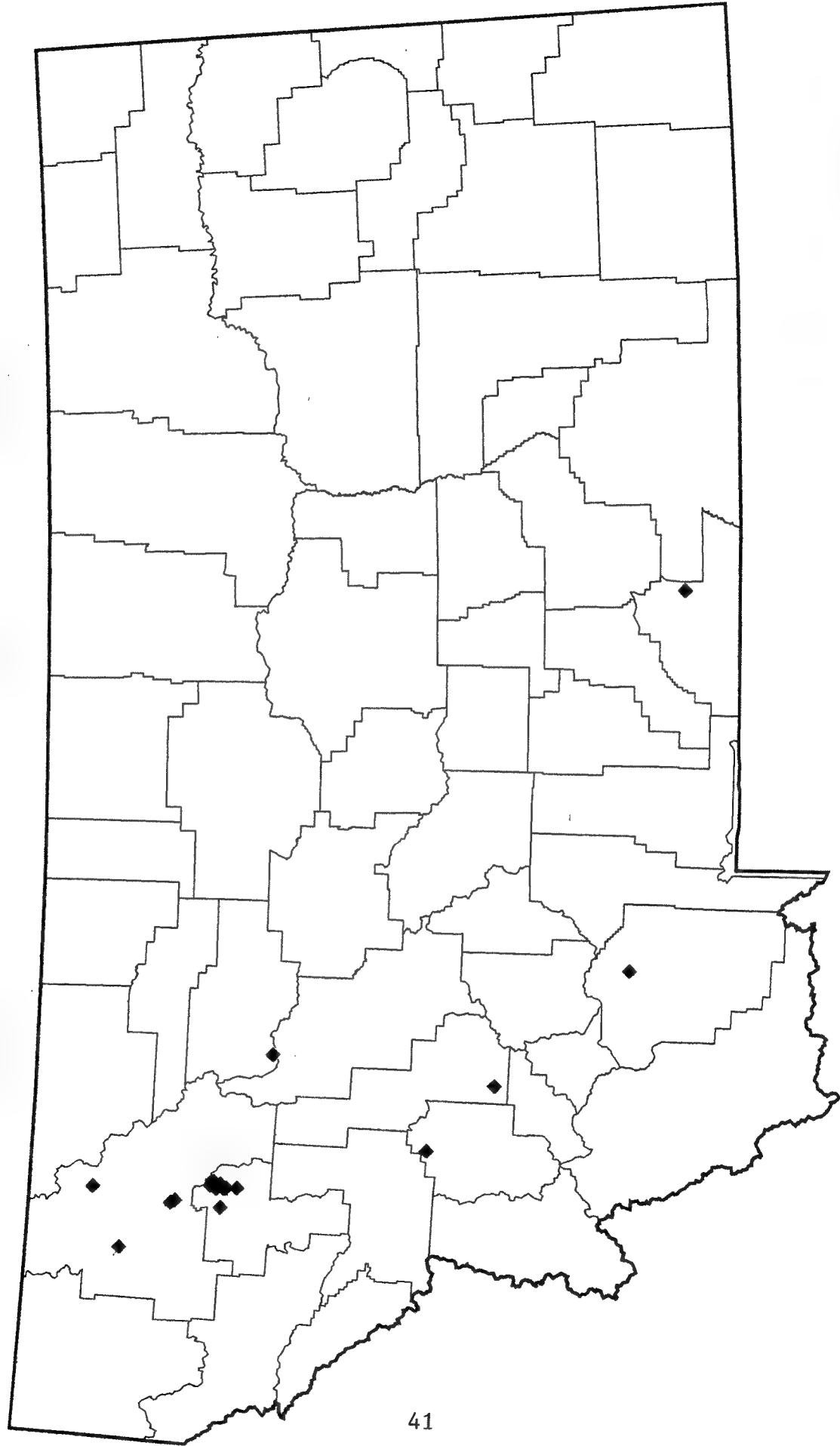
1. **Range of the species:** British Columbia south to Baja, California, across most of western North America, east to the Rocky Mountains and South Dakota and northern Mexico (Cronquist et al. 1977)
2. **Montana distribution:** *Epipactis gigantea* is known from 18 sites in the state, in Carbon, Flathead, Granite, Lake, Madison, Powell, and Teton counties. All but five occurrences are in Flathead and Lake Counties. One population on Flathead Lake is based on a 1912 collection and may be extirpated. Figure 14 is a map showing the Montana distribution of this species.
3. **Occurrences in the Tobacco Roots:** One population is known from the range on private land at Potosi Hot Springs (element occurrence 014). An Element Occurrence Record (EOR) and map showing the precise location of the population are given in Appendix C. Adjacent Beaverhead National Forest land around the nearby warm springs was surveyed but no plants were found.

D. Habitat

1. **Associated vegetation:** In Montana, *Epipactis gigantea* grows in wet woodlands, wet meadows, fens, and around springs and seeps with other emergent plants. Stem count numbers were highest in graminoid associations of *Typha latifolia* /*Eleocharis tenuis* and *Carex flava*/ *Agrostis tenuis* among four fen sites studied on the Flathead National Forest (Mantas 1993). Dominant tree species in the surrounding woodlands often include *Picea engelmannii* and *Betula papyrifera*. Shrubs associated in the same wetland basins include *Alnus incana*, *Cornus stolonifera*, *Rhamnus alnifolia* and species of *Salix*. Common herbs at these sites include *Habenaria dilatata*, *Helianthus nuttallii*, *Senecio triangularis*. Associates at Potosi Hot Springs are listed in the general site description field of the EOR in Appendix C.
2. **Topography:** *Epipactis gigantea* is always found near water, often around hot and warm springs and on deposits of travertine, but also at non-thermal springs and seeps, and in fens and swamps. In Montana the species occurs at low to middle elevations ranging from 884 to 1,859 meters (2,900-6,100 feet).

Figure 14

Distribution of *Epipactis gigantea* in Montana



3. **Soil relations:** The soils are saturated and are often but not always calcareous. At the fen sites, the soils are organic (histosols). Travertine deposits are mineral substrates. The roots of most, if not all, orchids have symbiotic relations with mycorrhizal soil fungi. For this reason they are often difficult to cultivate, however, *Epipactis gigantea*, has been cited as easily cultivated where a wet habitat can be supplied (Cronquist et al. 1977). Bailey (1950) states that soil fungi are not necessary for adult *Epipactis* to prosper, but are required for seed germination. It has been suggested that the frequent occurrence of *E. gigantea* near thermal springs, particularly in the northern end of its range, indicates that it may be intolerant of cold temperatures (Mantas 1993).

E. Population demography and biology

1. **Demographic details:** Estimates of population size in Montana range from around 100 to 10,000 aerial stems (ramets) that are often clonal, covering as much as 8 hectares (20 acres). Most populations consisted of around 200 ramets. The stem count at Potosi Hot Springs was estimated in 1990 to consist of 100-1,000 flowering stems covering less than a hectare (two acres).
2. **Reproductive biology:** Reproduction is sexual, by seed, and vegetative, by creeping rhizomes. Orchids, in general, have highly specialized pollination mechanisms, adapted to various insect and other vectors. They are commonly cross-pollinated in nature (Bailey 1950). Considering the difficulties involved in pollination and seedling establishment, colonies of *Epipactis gigantea* may reproduce primarily by rhizomes; this is supported by the dense stands and high number of vegetative stems observed in the field. Production of mature fruit is often observed to be low, and variable between years (Mantas 1993).

F. Management concerns: Although *Epipactis gigantea* has a broad distribution rangewide and in Montana, it is confined to specialized habitats which are easily disturbed and often heavily impacted. The most serious threats to populations are development or disturbance of the water supply (e.g. piping, channelization, or pool building, and adjacent logging and road construction), and trampling by people and cattle. Environmental factors having the greatest influence on species' population viability include water table depth, water chemistry, and conditions associated with the wetland/upland interface. These are key components to consider in any management activities potentially altering the habitat (Mantas 1993). Retention as a Sensitive plant by Region 1 of the U.S. Forest Service is recommended. Although the population at Potosi Hot Springs is on private land, Beaverhead National Forest management activities on adjacent land, especially upslope or upstream, may potentially impact the population.

Polygonum douglasii Greene ssp. *austinae* (Greene) Hickman
Austin's Knotweed

A. Description

1. **General description:** *Polygonum douglasii* ssp. *austinae* is an annual in the Polygonaceae (knotweed family). The stems are branched from the base and bear numerous elliptical to ovate shaped leaves which have short petioles and are jointed to the stipules. The flowers are borne singly or in small clusters in the leaf axils and are reflexed except when young. The greenish perianth with white to pink margins is five parted and fused at the base. The shiny black fruits are triangular in cross section. It flowers in late June and July and produces the mature fruits needed for positive identification by late July. Figure 15 is a photograph of the plant.
2. **Technical description of the subspecies** (adapted from Hitchcock and Cronquist 1964): Low-growing more or less scurfy annual 5-10(20) cm tall, branched at the base, ascending to erect; leaves numerous, jointed at the base, the lower ones ovate or elliptic to broadly oblanceolate, usually 5-15 mm long and 1/2 to 1/3 as broad, narrowed to a very short petiole, gradually reduced and becoming sessile upward and transitional to the uppermost small bracts; stipules 3-5 mm long, eventually lacerate; flowers 1-4 in the axils of all but the lowermost leaves, in slender, open racemes, soon reflexed, the pedicels 1-2 mm long; perianth 1.75-2.5 mm long, connate for about 1/4 the length, the segments 5, greenish with whitish or pink-tinged margins, stamens 5-8; styles 3, distinct, barely 0.5 mm long; achene triquitrous, black, nearly smooth, shining, 2-3 mm long, ovate in outline but tapered to both ends.
3. **Diagnostic characters:** The species is easily distinguished from other members of the genus by its erect habit, loose axillary inflorescences, and reflexed or recurved flowers (Dorn 1984). *Polygonum douglasii* ssp. *austinae* is distinguished from the nominate subspecies by its lower leaves, which are elliptical to ovate and are short petiolate vs. linear to narrowly oblong and without petioles in ssp. *douglasii*, and by its fruits, which are shorter (mostly <2.5 mm) than those of ssp. *douglasii* (>2.5 mm) (Hitchcock and Cronquist 1973). It typically has multiple basal branches as compared to the single-stemmed or sparsely-branched *D. douglasii* ssp. *douglasii*.



Figure 15

B. Present legal or other status

1. Federal

a. U.S. Fish and Wildlife Service: none

b. U.S. Forest Service: *Polygonum douglasii* ssp. *austinae* is designated Sensitive by Region 1 (USDA Forest Service 1994a).

- 2. State:** The Montana Natural Heritage Program ranks the subspecies G5T4 and S2S3 (Heidel 1994). This means the species is demonstrably secure globally (G5), while the subspecies is apparently secure globally (T4). Within Montana, the subspecies is vulnerable (S3) to very vulnerable (S2) to extinction due to rarity or other factors.

C. Geographic distribution

- 1. Range of the subspecies:** Central Oregon to northeast California, east across southern Idaho to south-central Montana and Wyoming, and reported from British Columbia (Hitchcock and Cronquist 1964).
- 2. Montana distribution:** *Polygonum douglasii* ssp. *austinae* is now known from ten sites in the western part of the state in Broadwater, Flathead, Lewis and Clark, Madison, and Pondera counties. Five of the sites are in the Big Belt Mountains on the Helena National Forest (Poole and Heidel 1993). The 1994 collection represents the first from Deerlodge National Forest. Figure 16 is a map showing the distribution of the taxon in Montana.
- 3. Occurrences in the Tobacco Roots:** One population was found on the northwest end of the range between Coal Pit Creek and Mill Creek on the Deerlodge National Forest. An Element Occurrence Record (EOR) and map showing the precise location of the population is included in Appendix C.

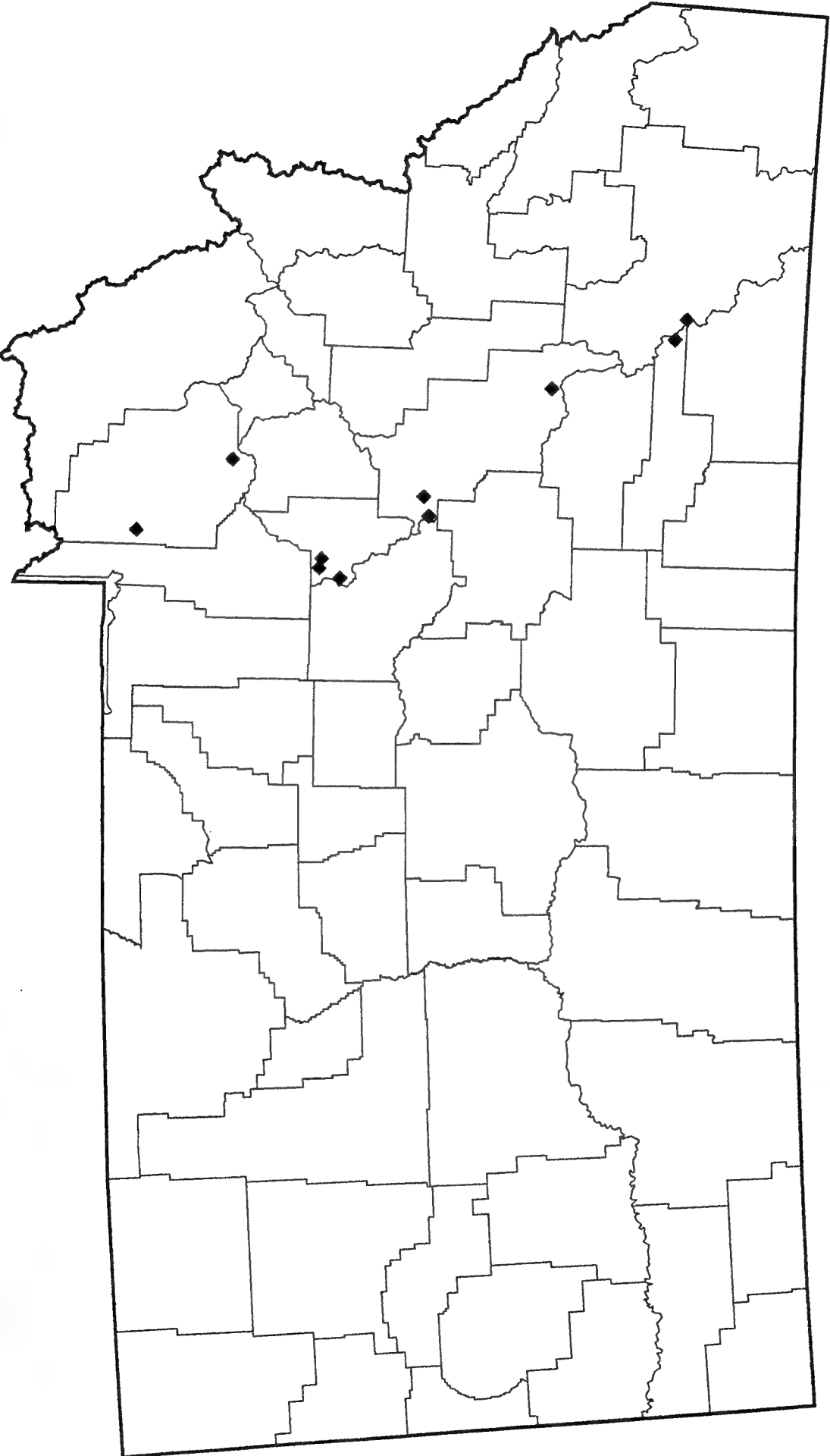
D. Habitat

- 1. Associated vegetation:** Throughout its range (Hitchcock and Cronquist 1964), *Polygonum douglasii* ssp. *austinae* is often associated with Ponderosa pine in openings or savanna conditions. In Montana, the subspecies is usually found in barren habitats with little vegetative cover. At the Coal Pit Creek site in the Tobacco Roots, it grows in sparsely vegetated openings in an open Douglas fir forest; Ponderosa pine is apparently missing from the range. Dominants in these early successional openings are *Artemisia tridentata*, *Artemisia campestris* and *Elymus spicatus*. A consistent immediate associate at this occurrence is *Physaria geyeri*. *Polygonum douglasii* ssp. *douglasii* also occurs in the vicinity. A more complete listing of associated plants is

Figure 16

Distribution of *Polygonum douglasii* ssp *austinae* in Montana

0 25 50
Miles



12/22/94

given in the general site description field of the EOR in Appendix C. Figure 17 is a photograph of the habitat between Coal Pit Creek and Mill Creek.

2. **Topography:** Most occurrences in Montana are on southerly facing slopes. Elevations at these sites range from 1,316 to 2,545 meters (4,320 to 8,350 feet). At Coal Pit Creek, the occurrence is at 1,987 to 2,036 meters (6,520 to 6,680 feet), on unglaciated south to southwest facing slopes, at midslope positions with 10-20% slope.
3. **Soil relations:** In Montana, *Polygonum douglasii* ssp. *austinae* usually grows in silty soils derived from shales, or in the shale itself. These substrates are mostly barren and are easily eroded, providing an early successional habitat to which some annuals are adapted. The Coal Pit Creek occurrence is close to the Wolsey shale geological mapping unit (Reid 1957), a narrow band of olive shales, brown shaly sandstone, and limestone conglomerate. The substrate at the site was primarily an unconsolidated shale, overlain higher up on the slope by limestone and metamorphic materials.

E. Population demographics and biology

1. **Demographic details:** Reported population numbers in Montana range from as few as six to over 10,000 plants. At other sites the taxon was described as "locally common" and in "large colonies." Population areas cited for the state range from a small shale mound (< 15 m²) to 20 hectares (50 acres). In 1994, the Coal Pit Creek occurrence in the Tobacco Roots consisted of about 30 plants in two subpopulations, covering less than a hectare (two acres). The southern subpopulation was located based only on dead plants from the previous year that still retained remnants of their inflorescences.
2. **Reproductive biology:** Plants grow from seed to produce seed in one growing season, in Montana usually flowering in mid-summer and producing fruit in August. Plants of the Coal Pit Creek population were in a late flowering stage in early August, 1994, with young fruits aborting due to the hot, dry weather. Phenology and population numbers of annuals often fluctuate drastically from year to year, following climatic cycles. In 1994, a hot, dry season, there were fewer annuals in general seen throughout southwestern Montana compared to 1993, a wet year. Survey work for this species on the Helena National Forest was also conducted in a drought year. The number of growing plants in any one year is a poor indicator of long term population size because the number of dormant seeds is not considered.



F. Management considerations:

Similar habitat settings along much of the length of Mill Creek and extending up from the trailhead are heavily invaded by annual bromes (primarily *Bromus tectorum*) and leafy spurge (*Euphorbia esula*). These invading competitors are absent from known *Polygonum douglasii* ssp. *austinae* habitat.

There were no existing threats identified to the small openings harboring this species or the hillsides in general, with possible exception of mining claims nearby.

It is still considered potentially imperiled in Montana based on the few number of occurrences. However, the current breadth of known distribution, and lack of apparent threat indicate that it may be more appropriate to recognize as a watch species rather than a sensitive species by the respective national forests. This amends the status recommendation previously presented for the taxon (Poole and Heidel 1993).

Potentilla quinquefolia Rydberg Five-leaf Cinquefoil

A. Description

1. **General description:** The name of *Potentilla quinquefolia*, in the Rose family, is somewhat misleading because most leaves have only three leaflets, however, some leaves with five leaflets are usually present. The plants are small herbaceous perennials and the leaves are compound and mostly basal. The undersides of the leaves are grayish with tangled, wooly hairs, while the uppersides are green with coarse to fine straight hairs. There are also one or two near full-sized leaves on the flowering stem. The inflorescences are somewhat flat-topped with the central (terminal) flower maturing first. The flowers, which are about 1/2 inch across, consist of a green five-lobed cup-forming calyx, five yellow petals, usually 20 stamens, and numerous pistils with styles that are warty and glandular at their base and attached near the top of the ovary. Figure 18 is an illustration of the plant. Plants flower in late June and July and produce fruit in August.
2. **Technical species description** (quoted from Hitchcock and Cronquist 1961): Perennial with a rather small, branched crown and short, ascending rootstocks, grayish lanate on the lower surface of the leaves and usually also on the stems, the upper surface of the leaves greenish but finely hirsute-sericeous; stems ascending to erect, 1-2 dm long; basal leaves numerous, mostly ternate but in part often with five leaflets and then usually digitate or sometimes more nearly pinnate, the leaflets more or less oblong, (0.5)1-2(3) cm long, dentate cleft for most of the length, the teeth

oblong-rounded, extending about halfway to the midvein; cauline leaves usually 1 or 2, not much reduced, often glandular as well as sericeous to semilanceolate; cymes rather closely several-flowered, conspicuously bracteate; calyx bowl shaped, sericeous-villous, barely 1 cm wide even in fruit, the lobes lanceolate, 3-4 mm long; petals yellow, obcordate, slightly longer than the sepals; stamens usually 20; pistils numerous; style glandular thickened and warty-pappilose at base, slender, subapical on the ovary, and longer than the smooth, 1.5 mm achene.

3. **Diagnostic characters:** *Potentilla quinquefolia* is part of a difficult complex that includes *P. nivea* and *P. uniflora* (Lesica and Shelly 1991). It is distinguished among other herbaceous perennials of the genus in Montana in combining mostly ternate leaves with a few leaves with 5 (but no more) leaflets. Other useful characters are the basally glandular roughened styles which are attached near the top of the ovary and the gray lanate lower leaf surfaces. Superficially, the Tobacco Roots material resembles *P. concinna*, which is more typical of montane limestone ridge habitat, but which has a slender and smooth style compared to *P. quinquefolia* and five or more leaflets.

B. Current legal or other status

1. Federal

- a. U.S. Fish and Wildlife Service: none
- b. U.S. Forest Service: none

2. **State:** The Montana Natural Heritage Program ranks *Potentilla quinquefolia* G4 and S1 (Heidel 1984), meaning the species is apparently secure globally but is especially vulnerable to extinction in Montana due to extreme rarity.

C. Geographical distribution

1. **Range of the species:** British Columbia and Saskatchewan south in the Rocky Mountains to Colorado and Utah (Hitchcock and Cronquist 1961). However, recent floras of Colorado, Utah, and Wyoming do not recognize the taxon or lump it with other species (see Weber and Wittmann 1992, Welsh 1987 and Dorn 1992).
2. **Montana distribution:** *Potentilla quinquefolia* has now been collected eight times in Montana, in Beaverhead, Flathead, Madison, and Pondera counties and in Glacier and Yellowstone National Parks. Three of these collections were taken before 1930. Figure 19 is a map showing the species' known distribution in Montana. The 1994 collection represents the first one from Deerlodge National Forest.

Figure 18



P. quinquefolia

From: Hitchcock et al. 1984

3. **Occurrences in the Tobacco Roots:** *Potentilla quinquefolia* was found once in the north end of the range above Perry Canyon (element occurrence 005) on the Deerlodge National Forest. An Element Occurrence Record and map showing the precise location are given in Appendix C.

D. Habitat

1. **Associated vegetation:** *Potentilla quinquefolia* is usually found in alpine and subalpine gravelly meadows (Hitchcock and Cronquist 1961, and at least one Montana collection from the Gravelly Range), but the Tobacco Root population is in a mountain mahogany/bluebunch wheatgrass community (*Cercocarpus ledifolius*/*Elymus spicatus*) in the montane zone. Additional associates at the site include *Erigeron compositus*, *Gutierrezia sarothrae*, *Penstemon attenuatus*, and *Physocarpus malvaceus*.
2. **Topography:** Most Montana occurrences are on ridgetops, usually above 2,438 meters (8,000 feet), but the Tobacco Roots occurrence is on a ridgetop just over 1,950 meters (6,400 feet); a historical collection from Mt. Aeneas in the Swan Range is also at a relatively low elevation (about 2,000 meters), but this is in a more humid climate regime.
3. **Soil relations:** Several of the Montana populations of *Potentilla quinquefolia*, including the one in the Tobacco Roots, occur on calcareous or limestone derived soils, but the species is not known to be confined to these substrates. The soils at two sites in Montana were described as gravelly. The soil at the Tobacco Root site is dry and silty with a high sand fraction, and is derived from Madison limestone.

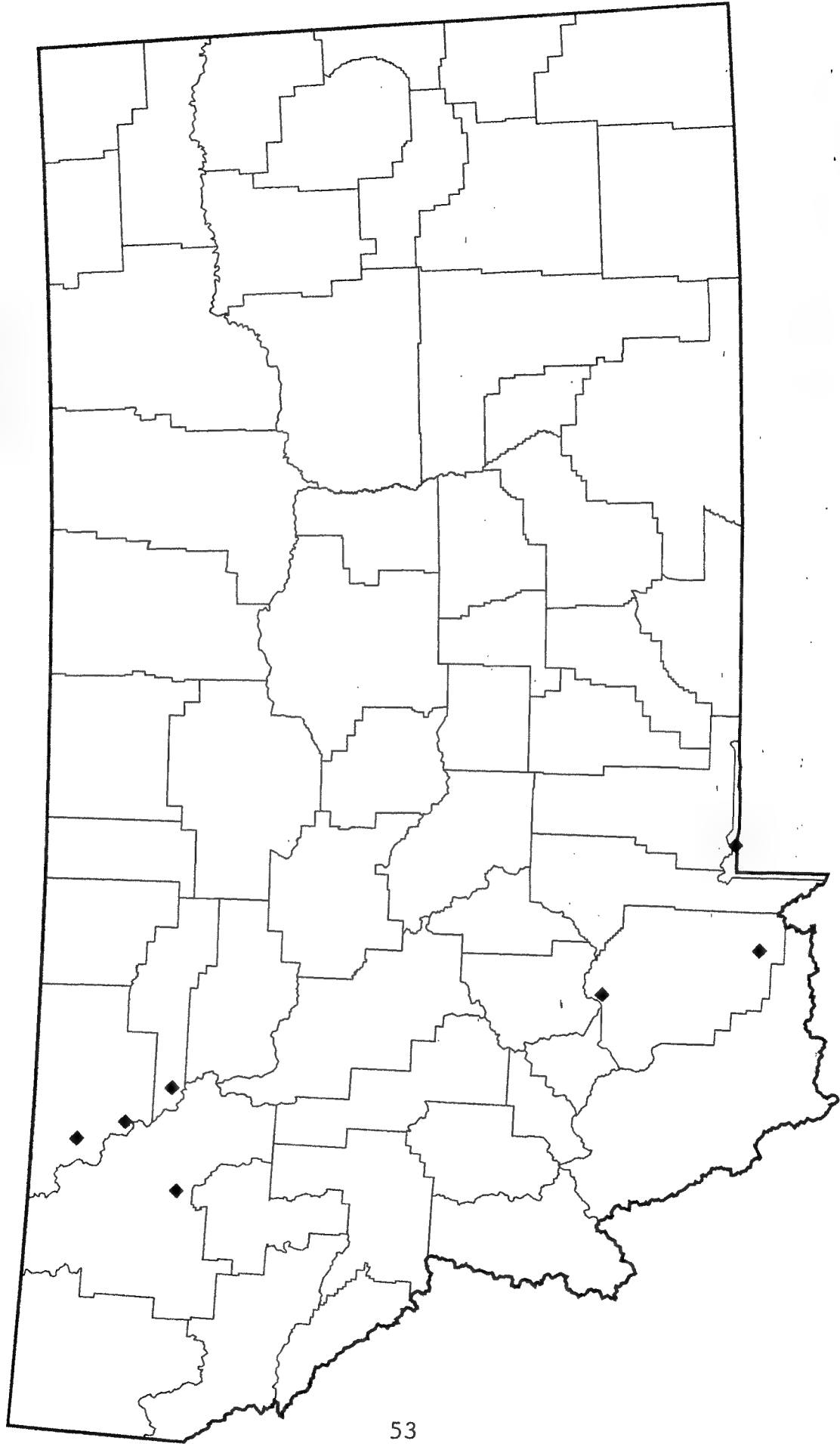
E. Population demographics and biology

1. **Demographic details:** None of the Montana populations have been completely surveyed. About 25 plants were observed across 2 hectares (5 acres) at the Tobacco Root site.
2. **Reproductive biology:** Reproduction is by seed.

F. Management concerns: Potential threats were not observed at the population site. Based on the taxonomic investigation that accompanied this survey study, and the unavailability of the taxonomic expert for consultation, this species will be ranked as "status undetermined" (SU) in Montana pending review of the treatment being prepared for the Flora of North America.

Figure 19

Distribution of *Potentilla quinquefolia* in Montana

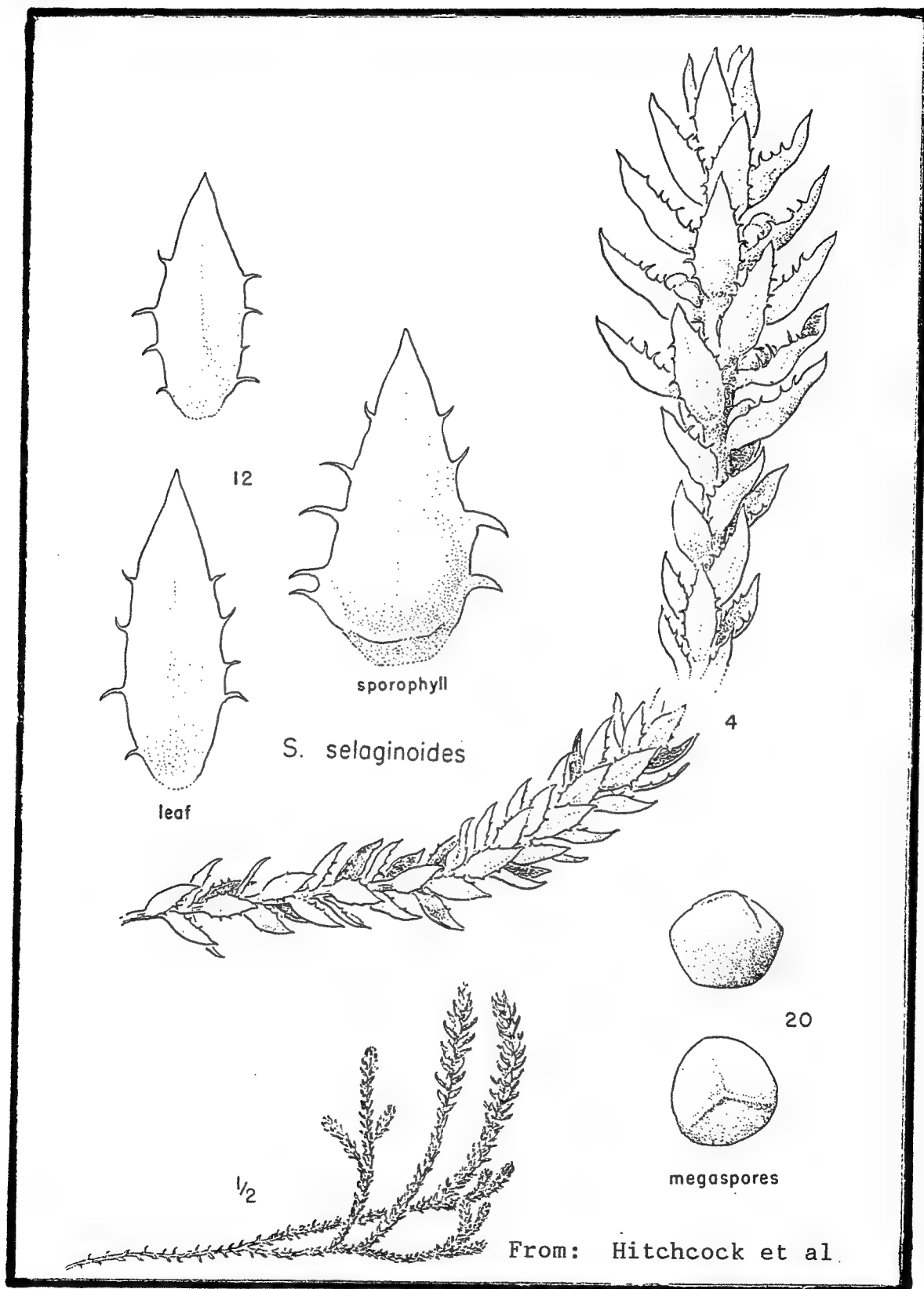


Selaginella selaginoides (L.) Link
Low or Northern Spikemoss

A. Description

1. **General description:** Northern spikemoss is a primitive vascular plant in the Selaginellaceae, a family of fern allies, but somewhat resembles the non-vascular mosses with which it grows and which give it its common name. The plants are low growing with spreading vegetative branches and erect reproductive branches terminated by "cones" or "strobili". The leaves are arranged in spirals on the branches. The vegetative leaves and the reproductive leaves (sporophylls) resemble each other but the latter are slightly larger. The sporophylls enclose spore bearing bodies, called sporangia, at their bases; these are of two kinds, megasporangia borne by the lower sporophylls which contain large (female) spores, and microsporangia borne by the upper sporophylls which contain smaller (male) spores. It produces the mature sporophylls needed for positive identification in late July. Figure 20 is an illustration of the plant.
2. **Technical description** (quoted from Cronquist et al. 1972): Stems dichotomously branched, some branches more or less prostrate and strictly vegetative, others loosely erect, arising 3-10 cm above the ground, and terminating in a lax cone 1-5 cm long; rhizophores apparently wanting; shoots all radially symmetrical, the leaves spirally arranged, lax, thin, 1.3-3 mm long (those of the erect stems somewhat larger than the others), lanceolate or lance-elliptic to lance-ovate, with a few spinulose teeth and a tapering to a usually short spinulose (but soft) tip; sporophylls larger than the vegetative leaves but otherwise much like them, loosely ascending, 2.5-5 mm long, spirally arranged like the leaves, the cone radially symmetrical, not quadrangular; spores whitish or ochroleucous, the megaspores about 0.5 mm in diameter, very finely and densely papillate on the outer face, more coarsely and sparsely so on the commissural faces. $2n = 18$.
3. **Diagnostic characters:** *Selaginella selaginoides* is distinguished from other members of the genus in Montana by having strobili which are lax and not 4-angled and consisting of sporophylls which are similar to but slightly larger than the vegetative leaves. Other species of *Selaginella* have 4-angled strobili with tightly imbricate sporophylls. The leaves also differ from other species by being relatively soft and thin and lacking a dorsal groove (Cronquist et al. 1972). It is also distinguished from other species in the state by its habitat as a hydrophyte rather than xerophyte. Superficially, it has the stature and form of some bryophytes with which it grows.

Figure 20



B. Present legal or other formal status

1. Federal

a. U. S. Fish and Wildlife Service: none

b. U. S. Forest Service: none

2. State: The Montana Natural Heritage Program ranks *Selaginella selaginoides* G5 and S1 (Heidel 1994), meaning the species is demonstrably secure globally, but is critically imperiled due to extreme rarity in Montana. It is also ranked S1 in Wyoming (Fertig 1994).

C. Geographical distribution

1. Species range: The species is circumboreal; In western America it is known irregularly from as far south as northern Nevada and northwestern Colorado, but is seldom collected south of Canada (Cronquist et al. 1972, Lellinger 1985).

2. Distribution in Montana: Before 1994, *Selaginella selaginoides* was collected six times from southwestern Montana, from the Anaconda and Pioneer Ranges in Beaverhead, Deerlodge, and Granite counties. Five of these populations are in the Anaconda Range. All known Montana sites are on the Beaverhead and Deerlodge National Forests. Figure 21 is a map showing the Montana distribution of the species.

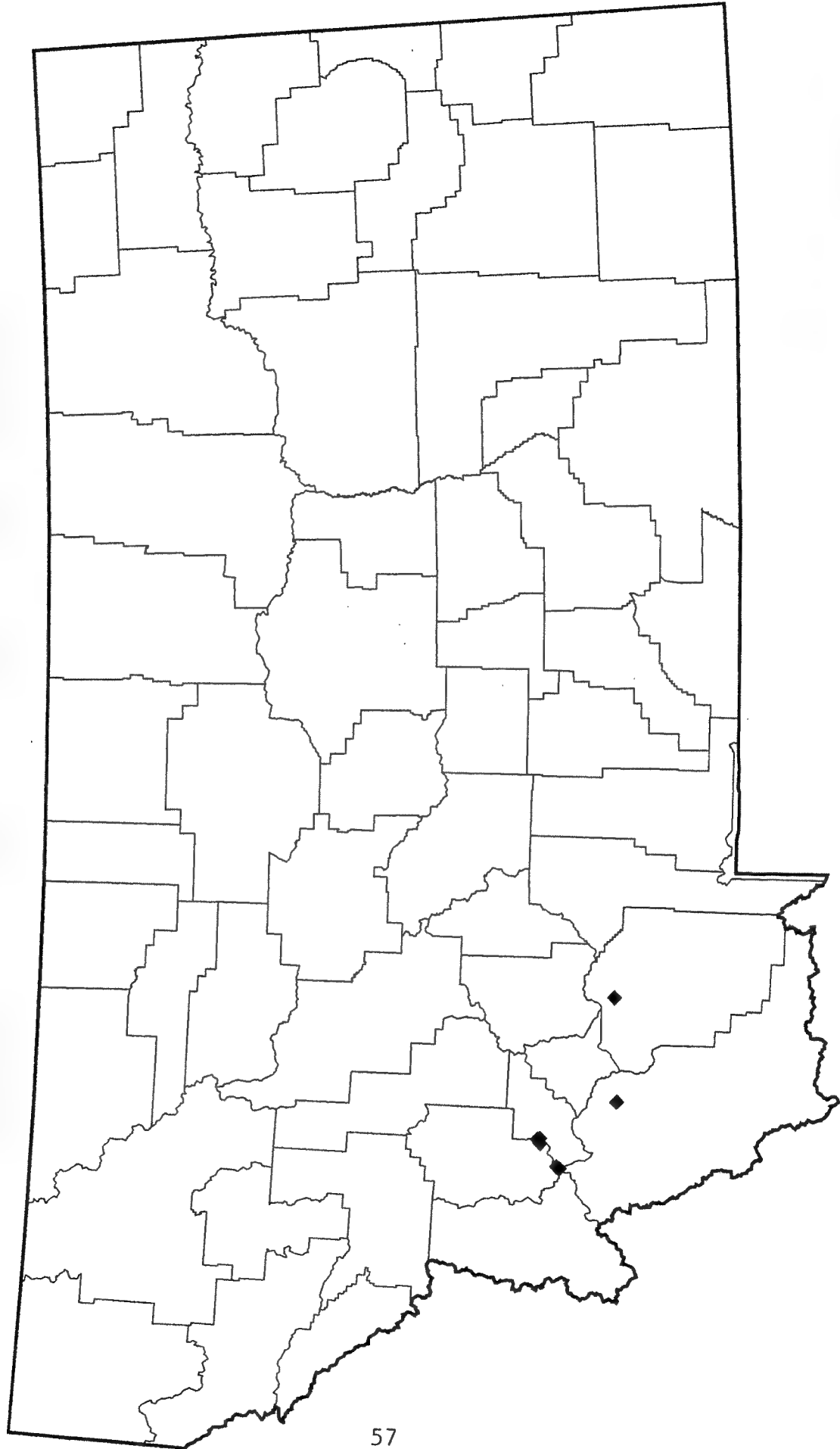
3. Occurrences in the Tobacco Roots: *Selaginella selaginoides* was documented on the Deerlodge National Forest near the headwaters of the South Boulder River in meadow microhabitat below Lost Cabin Lake. An Element Occurrence Record and map showing the precise location is included in Appendix C.

D. Habitat

1. Associated vegetation: *Selaginella selaginoides* grows in mossy localized habitats. The dominant vascular plant at the population microsite in the Tobacco Roots is *Carex scopulorum* in association with mosses on the north-facing margins of a few small spring-fed rivulets that are along the upper margins of a wet meadow. It appears to be restricted to groundwater discharge locales with intact vegetation. The Tobacco Roots microhabitat occurs in the broader setting of a wet meadow dominated by *Deschampsia cespitosa*. Additional associates at the site include other sedges (*Carex* spp.), a willow (*Salix planifolia*), a bog orchid (*Habenaria dilatata*), and other plants adapted to saturated soils; a more complete listing is given in the general site description field of the Element Occurrence Record in Appendix C. The general meadow setting for this species is depicted in Figure 5, but the discrete microhabitats within the setting are not represented.

Figure 21

Distribution of *Selaginella selaginoides* in Montana



2. **Topography:** In Montana, northern spike moss occurs in the mountains at middle elevations ranging from 2,255 to 2,545 meters (7,400 to 8,350 feet). It is usually along streams in valley bottoms or in seepy areas. Microsites cited for the plant throughout its range include streambanks, lakeshores, bogs, rocks, and wet talus (Lellinger 1985). In the Tobacco Roots, the species was found on the margins of three small rivulets at the upper margins of a broad meadow in a glaciated valley bottom at 2,522 meters (8,275 feet).
3. **Soil relations:** In the Tobacco Roots, the plants grow in consolidated peatmoss. Because of its close association with mosses throughout its range, *Selaginella selaginoides* is probably confined to histosols (saturated organic soils). Lellinger (1985) describes the soils where the plant grows as "neutral to slightly alkaline." The species is reported from a calcareous seep on the Beaverhead National Forest in the Pioneer Mountains but the pH in the Tobacco Roots is probably neutral; this would be controlled by water chemistry, a function of upstream rock type.

E. Population demographics and biology

1. **Demographic details:** Numerical estimates of population size are lacking for most occurrences of *Selaginella selaginoides* in Montana but descriptors range from "thinly scattered" to "large colonies" and "common." The population in the Tobacco Roots consisted of at least 100 ramets (with multiple ramets per genet) spanning less than a combined 20 m length of habitat.
2. **Reproductive biology:** Sexual reproduction is by spores. The spores develop into free-living gametophytes which produce the gametes, the eggs by the megagametophytes, the sperm by the microgametophytes. The gametes fuse and give rise to a new sporophyte. The sporophytes, at least, also reproduce vegetatively by spreading and breaking. It is unique in having an active "slingshot-like" megaspore dispersal mechanism (Flora of North America Editorial Committee 1993).

F. Management concerns:

The trail to Lost Cabin Lake skirts in and out of wet meadow setting, well above the saturated microhabitat to which this species is presently restricted. There were no apparent signs of use by stock or wildlife as compared to other surface water discharges along the meadow margins to the south. It is considered vulnerable to trampling and any alteration to the hydrology.

The *Selaginella selaginoides* is recommended for sensitive designation by the U.S. Forest Service in light of its restriction to intact localized habitat, vulnerability to disturbance, and state distribution exclusive to Beaverhead and Deerlodge national forest sites.

Taraxacum eriophorum Rydberg
Rocky Mountain Dandelion

Family: Asteraceae (Aster Family)

Diagnostic characters: *Taraxacum eriophorum* differs from exotic dandelions by having mostly entire leaves. It is distinguished from other native species of the genus by having reddish-brown fruits, and by its involucre bracts which do not have a terminal horn-like appendage (Dorn 1984). It flowers in June and July.

Current legal or other status: Bureau of Land Management proposed sensitive in Montana (USDI Bureau of Land Management 1993), Montana Natural Heritage Program G4 S1 (Heidel 1994).

Geographic distribution: The species has been recently collected in Montana only from southern Beaverhead County. It was collected once in Madison County in 1892 (L. A. Fitch s.n. at MONT) from the vicinity of Sheridan.

Habitat: Except for a small population discovered in 1993 in the Tendoy Mountains, information on the habitat where *Taraxacum eriophorum* occurs is vague. Dorn (1984) describes the habitat as "moist places, mostly in the mountains." The occurrence in the Tendoy was at about 2,133 meters (7,000 feet) in a moist canyon bottom with big sagebrush (*Artemisia tridentata* var. *tridentata*), Great Basin wildrye (*Elymus cinereus*), Douglas fir (*Pseudotsuga menziesii*), and an exotic dandelion (*Taraxacum laevigatum*) (Vanderhorst and Lesica 1994).

Comments: *Taraxacum eriophorum* is apparently extremely rare in Montana, known from only 3 recent collections in extreme southern Beaverhead County. It should be sought at lower elevations in the Tobacco Roots in moist to mesic rangeland. Its habitat may be expected to be heavily impacted by grazing and weed infestations.

DISCUSSION

Sensitive species designations are recommended for three of the species of special concern that have been documented in the Tobacco Roots, and watch designations by Beaverhead and Deerlodge National Forest are recommended for three more species, as summarized in Table 1. Sensitive status designation by the Northern Regional Office of U.S. Forest Service is recommended when the species are documented on national forest land and are very rare in Montana or populations are vulnerable to extirpation or decline due to other factors. Watch status designation by national forests is recommended when the species either is very rare in Montana and is documented adjoining national forest land, or is present on national forest land but its rarity in the state or vulnerability of populations to decline is questioned at this time.

Table 1. Montana plant species of special concern documented in the Tobacco Root Mountains and their current and recommended status.

Scientific name	Current USFS status (Region 1)	Recommended status
<i>Agoseris lackschewitzii</i>	sensitive	sensitive (B, D)
<i>Carex neurophora</i>	none	watch (B)
<i>Delphinium bicolor</i> ssp. novum	none	none
<i>Eleocharis rostellata</i>	none	watch (B)
<i>Epipactis gigantea</i>	sensitive	sensitive (B)
<i>Polygonum austinae</i> ssp. <i>douglasii</i>	sensitive	watch (D)
<i>Potentilla quinquefolia</i>	none	none
<i>Selaginella selaginoides</i>	none	sensitive (D)

All of these species are hydrophytes or xerophytes of open or semi-open habitats, most of them within the montane or subalpine zones. Though the habitats are small, they are potentially affected by many land uses and the habitats of hydrophytes in particular are affected by land uses in the surrounding watershed.

A pervasive threat to rare plants in the Tobacco Root Mountains is cattle grazing. Three target plant species documented in this study, *Agoseris lackschewitzii*, *Carex*

neurophora, and *Selaginella selaginoides*, are confined to wet meadow habitats where the impacts of grazing are concentrated and most damaging. Another species of special concern, *Taraxacum eriophorum*, which was not encountered but is historically known from the Sheridan area, also occupies primary range if it still persists in the area. Much of the wet meadow habitat visited during this project was not surveyable because vegetation was heavily grazed and thus not identifiable; other species of concern may occur there if they persist under the heavy grazing regime. Heavily impacted allotments need to be rested for making any evaluations pertaining to sensitive species or vegetation in general. Intense grazing was observed in the vicinities of Mason Lakes, Cataract Creek, the pothole basin below Albo Lake, North Meadow Creek, and the Leonard Creek drainage. Besides the direct effect of browsing on reducing the vigor and reproductive capacity of sensitive plants, cattle may also degrade habitat, especially of wet meadows and streamsides, by trampling, causing soil compaction, erosion, and altered water regimes, and by introducing and creating suitable habitat for exotic plant species. Other potential threats to rare plants in the range include the direct and indirect impacts of mining, logging, road building, water development projects, and off-road vehicle use.

Among the botanically noteworthy areas, there is at least one exceptional site which warrants protection consideration and further investigation: the fen in the drainage of Leonard Creek. It has a well-developed floating mat of sphagnum mosses, among the best developed example of this particular vegetation in Montana (Chadde pers. commun.). In addition to the mosses there are a number of northwestern Montana vascular plant species which are disjunct here (e.g., *Nuphar variegatum*, *Utricularia minor*), a possible occurrence of *Eleocharis rostellata* which warrants further investigation, and a potential occurrence of a sensitive mammal, the northern bog lemming, *Synaptomys borealis* (Shelley, pers. commun.). Parts of the Leonard Creek drainage are heavily grazed by cattle and altered by clearcuts and road construction nearby.

The floristic list compiled by this study (Appendix D) indicates a high level of plant diversity and the progress made toward compiling a botanical baseline. It remains a preliminary representation of the flora in light of the limited time and extent of survey over a single season. The growing season of 1994 was exceptionally hot and dry by mid-summer, complicating the study of annual species in particular. Relatively complete floristic surveys of areas of similar size and ecological diversity generally require at least two full growing seasons and the following winters spent on herbarium studies (in addition to writing) by one or more workers (see Fertig 1992, and Vanderhorst 1993). A longer sampling period allows for more complete investigation of the local flora, compensation for climatic variation, and follow-ups to taxonomic and other questions brought to light by herbarium work, as well as more thorough geographic coverage.

Many of the prospective target species identified for survey in this area (Appendix A) were not located in the Tobacco Root Mountains. Those sensitive species occurring on more than one range adjoining the Tobacco Roots that were extensively sought without success include *Juncus hallii* and *Thlaspi parviflorum*.

The documented rare species include Northern cordilleran taxa with distributions that taper off in Montana (*Carex neurophora*, *Polygonum douglasii* ssp. *austinae*, *Potentilla quinquefolia*, *Taraxacum eriophorum*), circumboreal species that are rare in the Rocky Mountains (*Selaginella selaginoides*), species that are widespread although sparse across western North America (*Eleocharis rostellata*, *Epipactis gigantea*), and state or regional endemics (*Agoseris lackschewitzii*, *Delphinium bicolor* ssp. *novum*). Also present in the flora, and included among documented range extensions, were species that have their centers of distribution in the Central or Southern Rocky Mountains (e.g., *Trifolium dasyphyllum*) and in addition to the Rocky Mountain, Great Plains, alpine, and ubiquitous taxa that make up much of the rest of the flora.

There are specific questions raised by this study concerning sensitive or prospective sensitive plants which require further investigation. *Castilleja nivea*, a regional endemic of alpine meadows in south and central Montana and adjacent Wyoming, was seen twice and collected once in the Tobacco Roots, but data on abundance or threats was not collected. In Wyoming, *Castilleja nivea* is tracked by the Wyoming Natural Diversity Database as a species of limited distribution, and is ranked S2 (Fertig 1994). It had been added to the watch list for possible tracking by the Montana Natural Heritage Program (Heidel 1994) based on recommendation of a Sarah Mathews, a taxonomist familiar with the genus. In addition, collection was made of *Juncus nevadensis*, a Great Basin species which may not have been previously collected in the state, and which is noted as "reported" for Montana in Dorn (1984). It was observed more than once in the Tobacco Roots. It will be confirmed as an addition to the state flora, and herbarium research and other background investigation will be pursued before considering it as an addition to the state plant species of special concern list.

The population of *Polygonum douglasii* ssp. *austinae* at Coal Pit Creek needs to be resurveyed in a favorable growing season to determine population size. Historical records of *Taraxacum eriophorum* need to be surveyed more closely east of Sheridan and north of Virginia City. Taxonomic questions remain unresolved concerning the apparently undescribed *Draba* which was collected at least four times from the alpine of the range. The possible occurrence of *Eleocharis rostellata* at the Leonard Creek fen needs to be verified as does *Carex multicostata* along Mill Creek of the Deerlodge National Forest.

These questions are an indication of the initial progress made in understanding the rare plants and general flora of the Tobacco Root Mountains and the need for building upon this information.

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APPENDIX A: Preliminary list of target sensitive plants and Montana plant species of special concern (Heidel 1994) for the Tobacco Root Mountains. Columns are included for the current U.S. Forest Service Region 1 status (USDA Forest Service 1994) and Montana Natural Heritage Program global and state rank (Heidel 1994). The final column gives the number of records known from the study area prior to 1994 and/or the distribution of the taxa in nearby areas outside the study area.

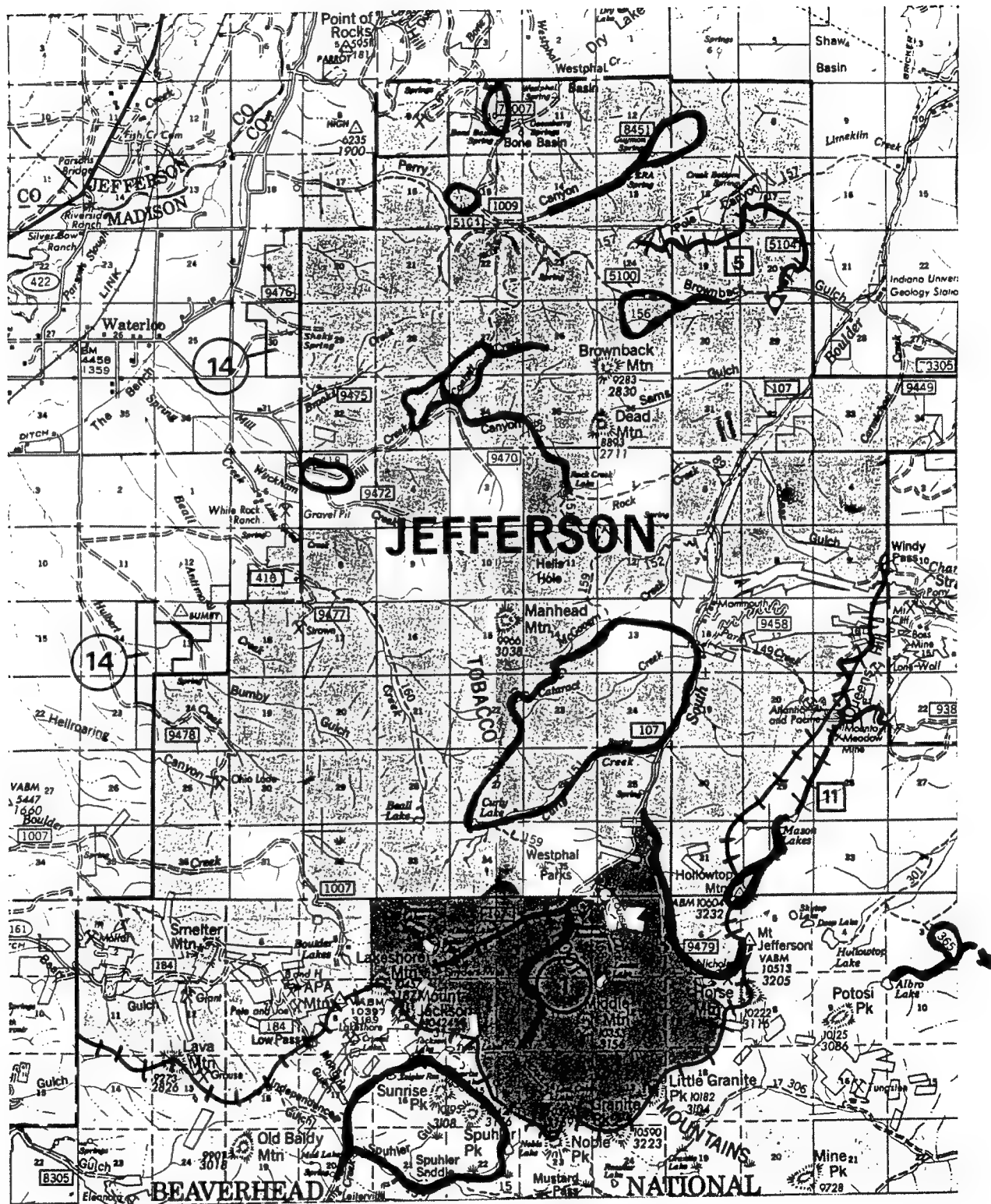
<u>Scientific name</u>	<u>USFS STATUS</u>	<u>MTNHP RANKS</u>	<u>Number of study area records/ or distribution in adjoining ranges</u>
<i>Adoxa moschatellina</i>	sensitive	G5S1	Main Rocky Mt. chain to north
<i>Agoseris lackschewitzii</i>	sensitive	G3S2S3	4 occurrences known in the Tobacco Roots prior to 1994
<i>Allotropa virgata</i>	sensitive	G4S2S3	Highland Mts. to west
<i>Arabis fecunda</i>	sensitive	G2S2	Highland Mts. to west
<i>Astragalus platytropis</i>	-	G5S2	Gold Hill area on BLM land in the Tobacco Roots
<i>Astragalus terminalis</i>	-	G3G4S2	Gravelly Range to south
<i>Carex aenea</i>	-	G3SU	Gallatin Range to east
<i>Carex parryana</i> ssp. <i>idaho</i>	sensitive	G2QS2	Highland Mts. to west
<i>Carex multicostrata</i>	watch	G5S1	Gallatin Mts. to east
<i>Carex occidentalis</i>	-	G4SH	Beaverhead Co. - Gravelly Range?
<i>Castilleja exilis</i>	-	G5SH	Historic record near Whitehall; probably outside of USFS boundaries
<i>Castilleja gracillima</i>	sensitive	G3G4S1	Two historic collections from near Sheridan and Pony, also known from the upper Gallatin and Madison River drainages to the southeast
<i>Cypripedium calceolus</i>	sensitive	G5S2S3	Western and southcentral Montana mountains and valleys

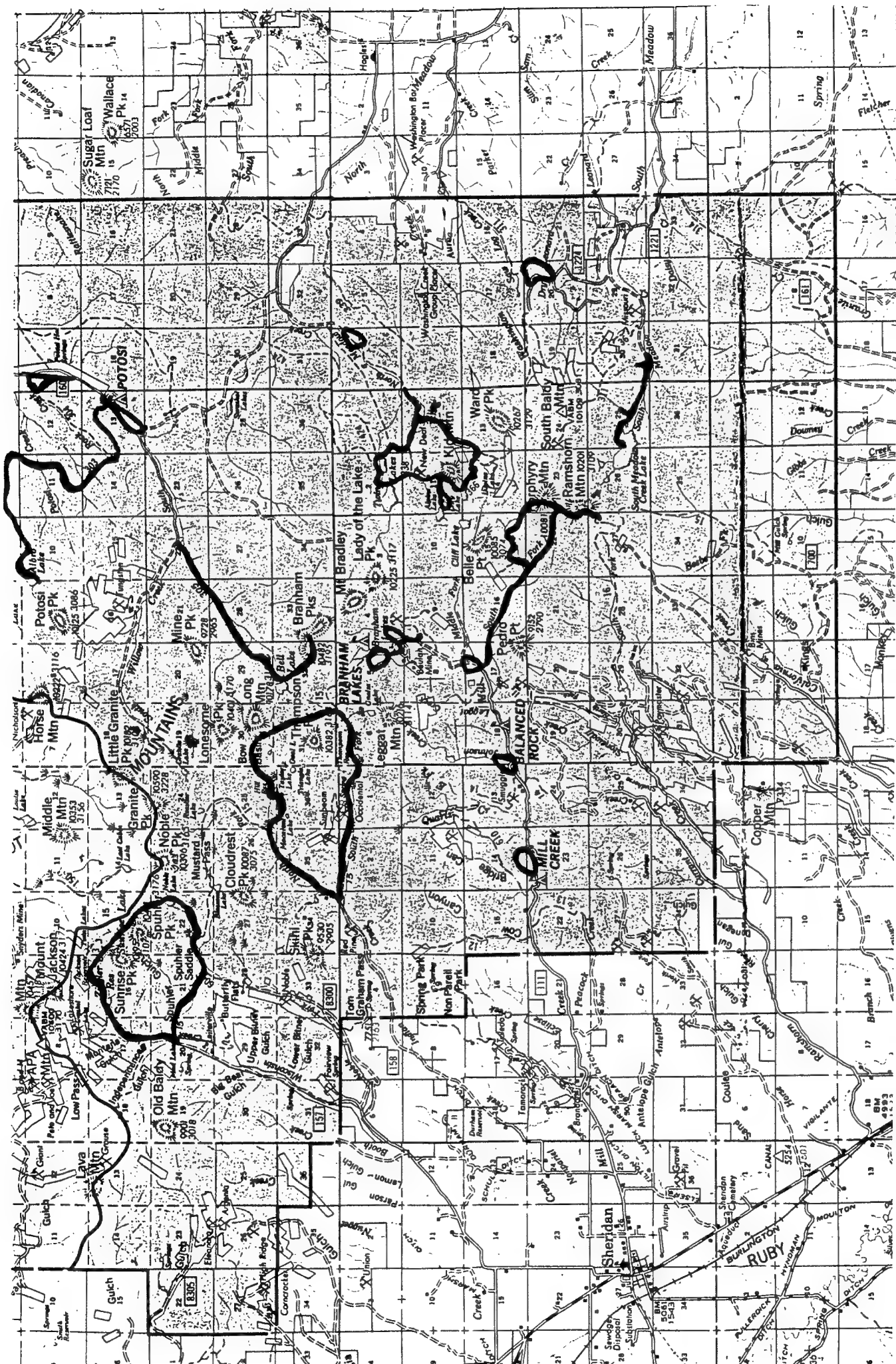
<i>Delphinium bicolor</i> ssp. novum	-	G3S3	Jefferson River, Pioneer Mountains
<i>Downingia laeta</i>	-	G5S1	Willow Cr. reservoir (Harrison Lk.) below east side of Tobacco Roots
<i>Draba densifolia</i>	-	G5S2	Main Rocky Mt. chain to north
<i>Draba globosa</i>	-	G?S1	Gravelly Range to south
<i>Draba ventosa</i>	-	G2G3S1	Misidentified material from Bell Lk. in the Tobacco Roots
<i>Dryas integrifolia</i>	-	G5S1	Big Snowy Mts. to northeast, growing with <i>Dryas octopetala</i> , which occurs in the Tobacco Roots
<i>Eleocharis rostellata</i>	-	G5S1	(see <i>Epipactis gigantea</i>)
<i>Epipactis gigantea</i>	sensitive	G4S2	One occurrence in the Tobacco Roots at Potosi Hot Springs adjacent to the Beaverhead National Forest
<i>Erigeron formosissimus</i>	-	G4T4S1	Gravelly Range to south, Absaroka/Beartooth Range to east; Beartrap Canyon record in question
<i>Gentiana tenella</i>	-	G4S2	Gravelly Range to south
<i>Haplopappus macronema</i> ssp. linearis	-	G4T?S2	Highland Mts. to west
<i>Juncus hallii</i>	sensitive	G4G5S2	Gallatin Range to east; Gravelly Range to south; Highland Range to west
<i>Machaeranthera commixta</i>	-	G?T3T4S1	Ruby Range to southwest
<i>Orogenia fusiformis</i>	sensitive	G5S2	Gravelly Range to south
<i>Oryzopsis contracta</i>	sensitive	G2SU	Known in Montana only by a historical collection from the "Beaverhead National Forest"

<i>Oxytropis lagopus</i> var. <i>conjungens</i>	-	G4T3S3	Endemic to west-central Montana
<i>Penstemon attenuatus</i> var. <i>militaris</i>	sensitive	G4T4S1	Known from the Bitterroot Mts. to the east; <i>P. attenuatus</i> var. <i>pseudoprocerus</i> is in Tobacco Roots
<i>Penstemon lemhiensis</i>	sensitive	G3S2	Highland Mts. to west
<i>Polygonum douglasii</i> ssp. <i>austinae</i>	sensitive	G4T4S2	Big Belt Mountains to north
<i>Potentilla brevifolia</i>	-	G4S1	Madison Range to southeast
<i>Potentilla quinquefolia</i>	-	G4S1	Gravelly Range to south
<i>Ranunculus jovis</i>	sensitive	G4G5S1S2	Madison Range to the southwest
<i>Ranunculus verecundus</i>	-	G5S1	Highland Mts. to west
<i>Salix wolfii</i> var. <i>wolfii</i>	sensitive	G4T4S1	Gravelly Range to south
<i>Saxifraga tempestiva</i>	sensitive	G2S2	Highland Mts. to west
<i>Sidalcea oregana</i>	-	G5S1	Gallatin Range to east
<i>Sparganium androcladum</i>	-	G4G5SU	Gallatin Range (?) to east
<i>Stephanomeria spinosa</i>	-	G4S1	Historic collections from Gravelly Range and Ennis area
<i>Taraxacum eriophorum</i>	-	G4S1	Historic collection from Sheridan area
<i>Thlaspi parviflorum</i>	sensitive	G3S2	Gravelly Range to south, Highland Mts. to west
<i>Viola renifolia</i>	sensitive	G5S2	Highland Mts. to west

APPENDIX B. Maps of the Tobacco Root Mountains showing primary survey routes. Map 1: Northern half (USDA Forest Service 1990)

APPENDIX B. Maps of the Tobacco Root Mountains showing primary survey routes. Map 1: Northern half (USDA Forest Service 1990)





APPENDIX B. Survey routes, Map 2: southern half (USDA Forest Service 1981)

APPENDIX C: Element Occurrence Records (EORs) and USGS topographic maps showing the precise locations of populations of sensitive plants and plant species of special state concern in the Tobacco Root Mountains. Throughout the text, these occurrences are referred to by the last three digits of the occurrence code and site name given on the EORs.

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.003
Element occurrence type:

Survey site name: MCKELVEY LAKE
EO rank:
EO rank comments:

County: MADISON

USGS quadrangle: RAMSHORN MOUNTAIN

Township: Range: Section: TRS comments:
004S 003W 11 SW4; 14 NW4

Precision: S
Survey date: 1984-08-27 Elevation: 8760 -
First observation: 1982 Slope/aspect:
Last observation: 1994-08-10 Size (acres): 10

Location:
SOUTHWEST SHORE OF MCKELVEY LAKE, NEAR INLET; NORTH SHORE. TOBACCO
ROOT MOUNTAINS. ABOUT 13 MILES NORTHWEST OF ENNIS. ALSO IN WET MEADOWS
AROUND OUTLET NORTHEAST OF LAKE.

Element occurrence data:
CA. 200-500 PLANTS, DENSE POPULATION.

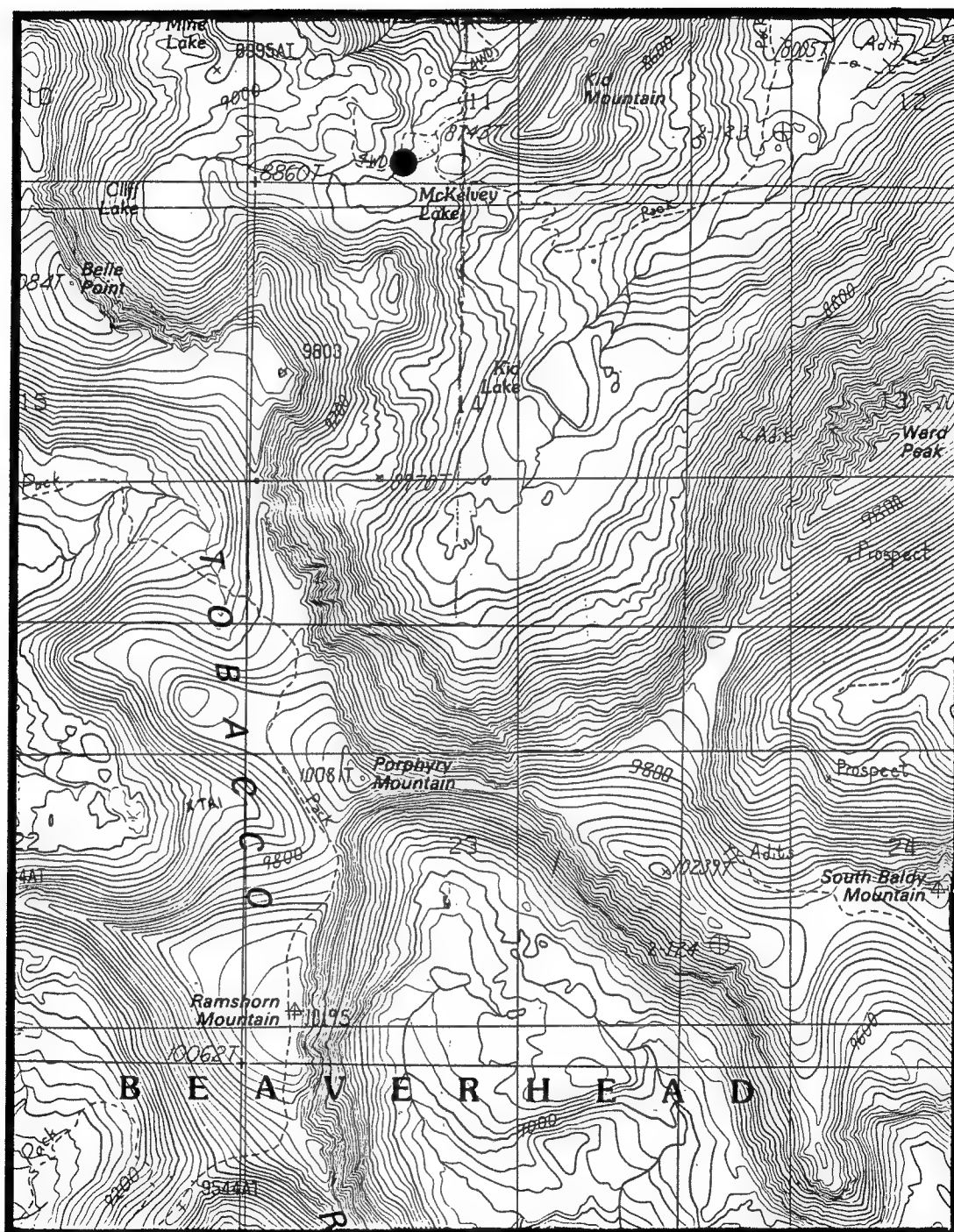
General site description:
MOIST MEADOW.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:
WET MEADOWS IN AREA CROSSED BY ILLICIT ATV TRAILS.

Information source: SENSITIVE PLANT COORDINATOR, BEAVERHEAD NATIONAL
FOREST, 610 NORTH MONTANA STREET, DILLON, MT
59725.

Specimens: LACKSCHEWITZ, K. (S.N.). 1982. SPECIMEN# 10191. MONTU.
MOSELEY (579). 1984. ID.



Agoseris lackschewitzii: McKelvey Lake (003)
USGS Ramshorn Mountain 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.004
Element occurrence type:

Survey site name: HOLLOWTOP LAKE
EO rank:
EO rank comments:

County: MADISON

USGS quadrangle: POTOSI PEAK

Township: Range: Section: TRS comments:
003S 003W 04 W2

Precision: S
Survey date: 1984-08-28 Elevation: 8560 -
First observation: 1984 Slope/aspect:
Last observation: 1984-08-28 Size (acres): 0

Location:
WEST SHORE OF HOLLOWTOP LAKE, TOBACCO ROOT MOUNTAINS. ABOUT 6 MILES
SOUTHWEST OF PONY.

Element occurrence data:
UNKNOWN.

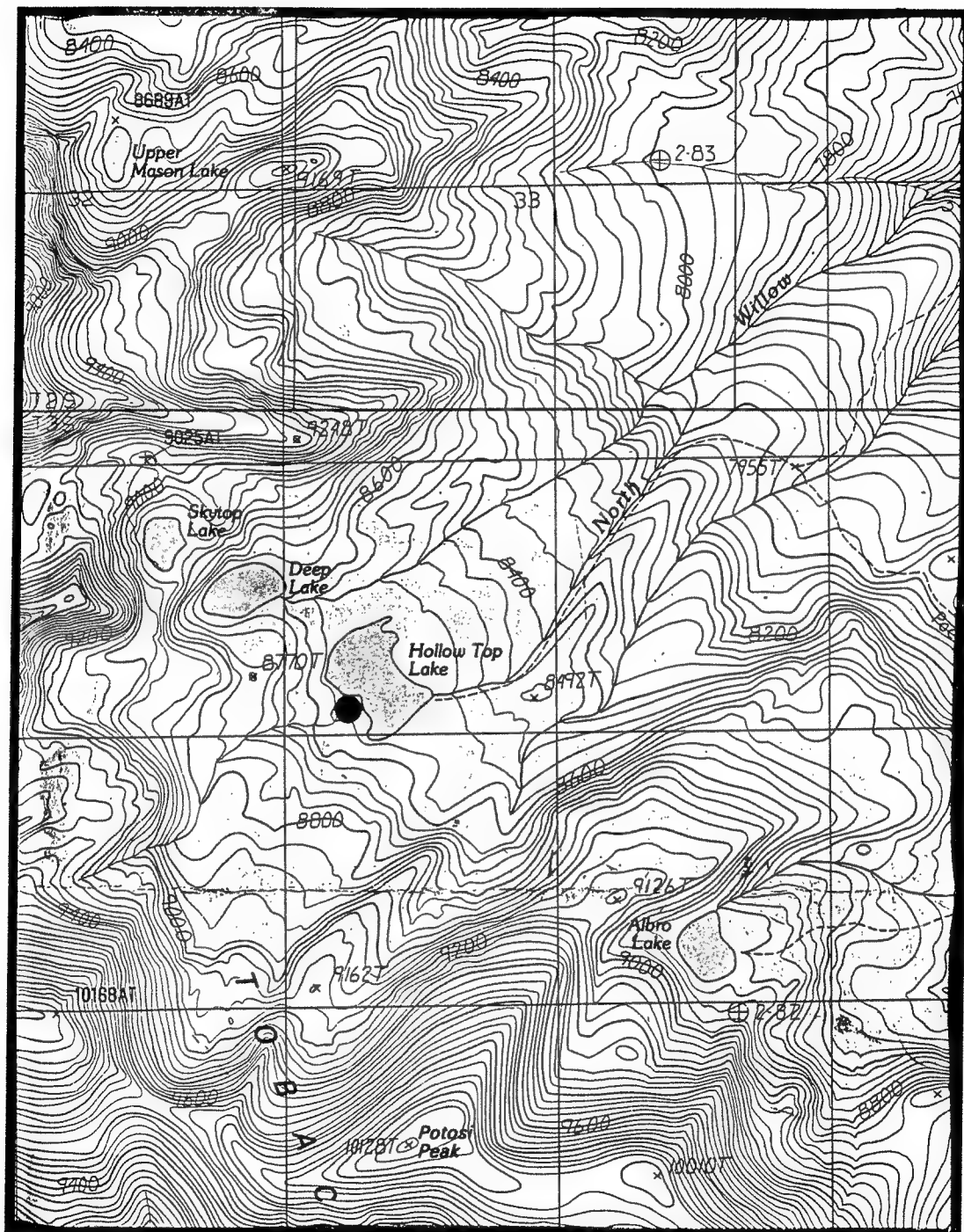
General site description:
WET MEADOW.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:
NONE.

Information source: SENSITIVE PLANT COORDINATOR, BEAVERHEAD NATIONAL
FOREST, 610 NORTH MONTANA STREET, DILLON, MT
59725.

Specimens: MOSELEY. (581). 1984. ID.



Agoseris lackschewitzii: Hollowtop Lake (004)
USGS Potosi Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.032
Element occurrence type:

Survey site name: MILL CREEK
EO rank:
EO rank comments:

County: MADISON

USGS quadrangle: POTOSI PEAK

Township: Range: Section: TRS comments:
004S 003W 04 SW4SW4

Precision: S
Survey date: Elevation: 8400 - 8600
First observation: 1992-07-17 Slope/aspect: 0-15% / S-SW
Last observation: 1994-08-07 Size (acres): 10

Location:
TRAVEL EAST OUT OF SHERIDAN ON THE MILL CREEK ROAD CA. 11 MILES TO
JUST SOUTH OF BRANHAM LAKES. POPULATION IS ON UNNAMED TRIBUTARY OF
MILL CREEK CA. 0.25 MILE UPSTREAM FROM WHERE IT JOINS MILL CREEK. ALSO
ALONG MILL CREEK ABOVE THIS CONFLUENCE.

Element occurrence data:
1992: 1+ INDIVIDUALS, FLOWERING. 1994: 2 SUBPOPULATIONS WITH 50+
INDIVIDUALS, IN FRUIT.

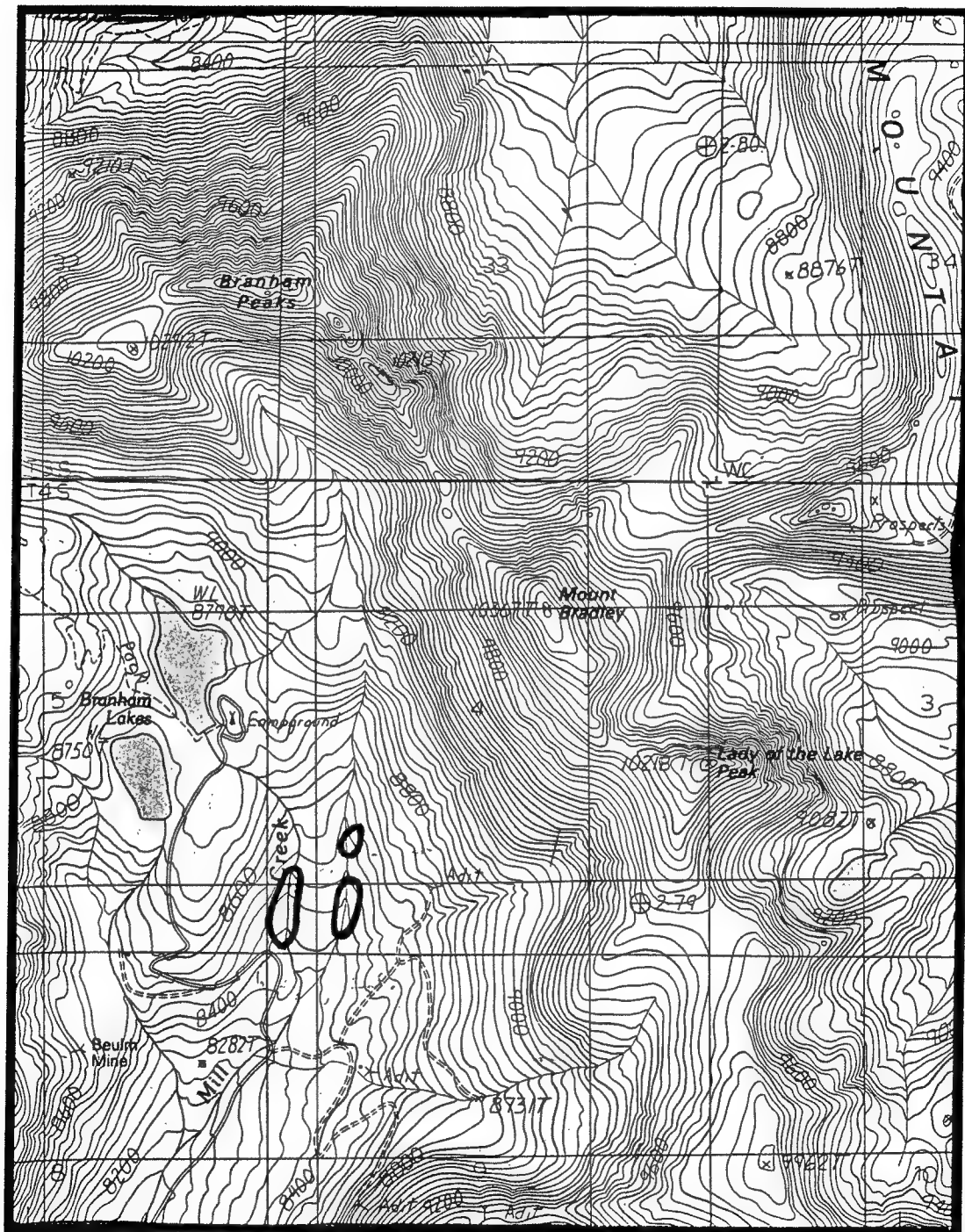
General site description:
PARTIALLY-SHADED EXPOSURE ON CONCAVE SLOPE; MOIST AREA ON LOWER SLOPE
OF GLACIATED MOUNTAIN VALLEY. GNEISS PARENT MATERIAL. SALIX
CANDIDA/CAREX ROSTRATA HABITAT TYPE, WITH PICEA ENGELMANNII, PINUS
ALBICAULIS, SALIX EASTWOODIAE, DESCHAMPSIA CESPITOSA, PHLEUM PRATENSE,
POLYGONUM BISTORTOIDES, SALIX WOLFII, ARNICA MOLLIS, SENECA
TRIANGULARIS, ERIGERON PERIGRINUS, ALLIUM SCHOENOPRASM.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, SHERIDAN RANGER DISTRICT

Comments:
SURVEY CONDUCTED BY K. SUZUKI IN 1992. EXTENSIVE SURVEY NOT COMPLETED.
EVIDENCE OF HEAVY LIVESTOCK GRAZING. HABITAT NOT GRAZED BY SURVEY DATE
IN 1994.

Information source: SENSITIVE PLANT COORDINATOR, BEAVERHEAD NATIONAL
FOREST, 610 NORTH MONTANA STREET, DILLON, MT
59725.

Specimens: VANDERHORST, J. (5274). 1994. MONT.



Agoseris lackschewitzii: Mill Creek (032)
USGS Potosi Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.039
Element occurrence type:

Survey site name: CURLY CREEK TRAIL
EO rank: BC
EO rank comments: POPULATION NUMBERS ARE LOW AND TWO OF THE THREE
SUBPOPULATIONS ADJOIN THE TRAIL.

County: MADISON

USGS quadrangle: MANHEAD MOUNTAIN
NOBLE PEAK

Township: Range: Section: TRS comments:
002S 004W 27 SE4; 26 SE4NW4; 34 NE4NW4

Precision: S
Survey date: 1994-08-11 Elevation: 7805 - 8580
First observation: 1993-08-10 Slope/aspect: 0-2% / SE
Last observation: 1994-08-11 Size (acres): 1

Location:
TOBACCO ROOT MOUNTAINS SOUTHWEST OF MAMMOTH IN WET MEADOW ADJACENT TO
AND ABOVE CURLY CREEK TRAIL, 1.5, 2.25, AND 3 MILES ABOVE TRAILHEAD.

Element occurrence data:
AT LEAST 70 FLOWERING STEMS, IN THREE SUBPOPULATIONS, WITH HIGHEST
NUMBERS EVENLY SPLIT BETWEEN UPPER TWO SUBPOPULATIONS. IN FRUIT
8/11/94, IN FLOWER 8/11/93.

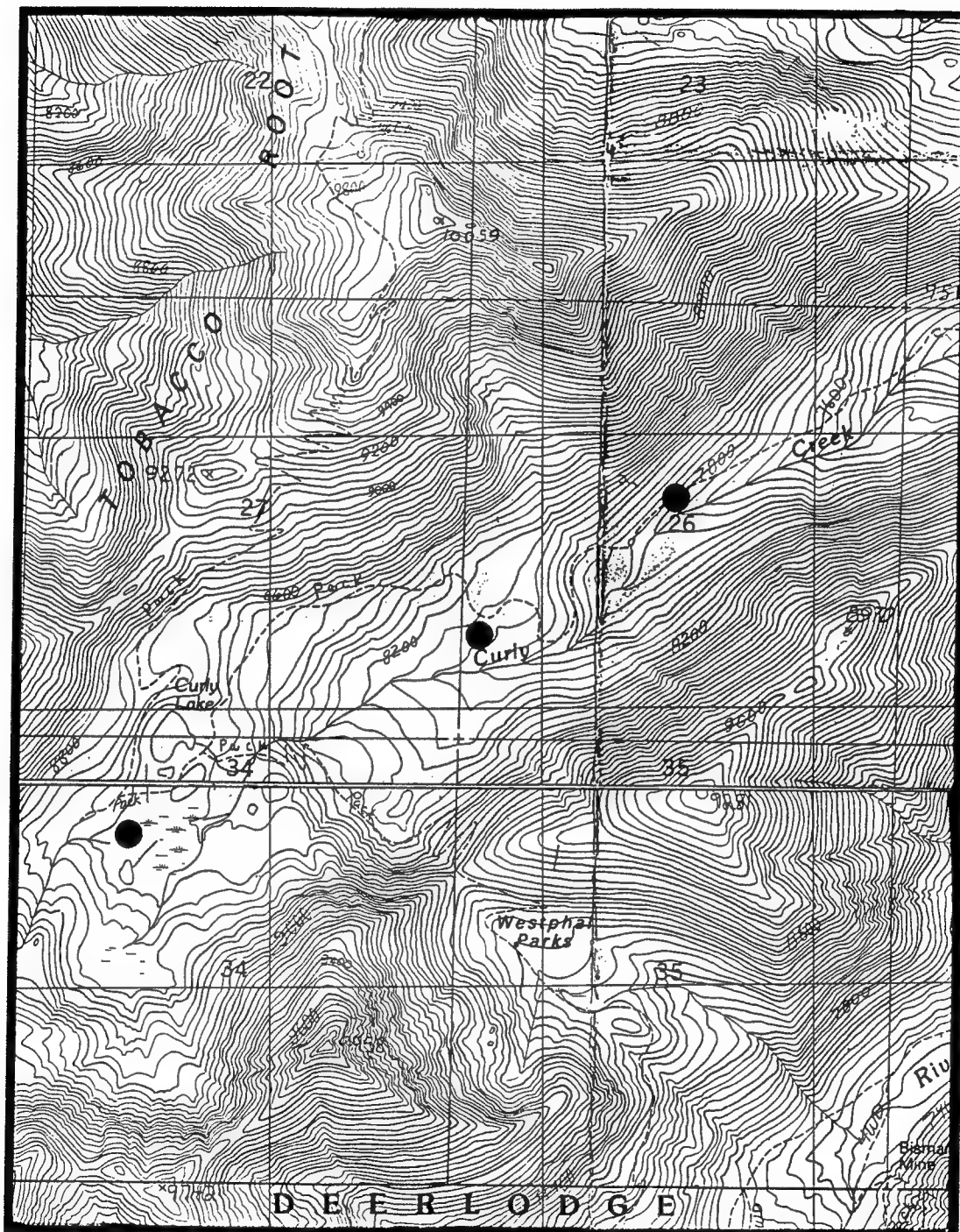
General site description:
WET TO SATURATED, OPEN MEADOWS. TWO SUBPOPULATIONS ARE IN SMALL
OPENINGS AND ONE IS IN THE MIDDLE OF A LARGE WETLAND. ASSOCIATED
SPECIES: CAREX NEBRASCENSIS, CALAMAGROSTIS INEXPANSA, PEDICULARIS
GROENLANDICA, DESCHAMPSIA CESPITOSA.

Land owner/manager:
DEERLODGE NATIONAL FOREST, JEFFERSON RANGER DISTRICT

Comments:

Information source: JOY, JOHN. FOREST ECOLOGIST, DEERLODGE NATIONAL
FOREST, JEFFERSON RANGER DISTRICT. 405 EAST
LEGION, P.O. BOX F, WHITEHALL, MONTANA 59759;
(406) 287-3223.

Specimens: B. HEIDEL. (1306). 1994. MONT.



Agoseris lackschewitzii: Curly Creek Trail (039)
 USGS Manhead Mountain and Noble Peak 7.5' quadrangles

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.049
Element occurrence type:

Survey site name: HOLLOWTOP MOUNTAIN
EO rank: C
EO rank comments: SMALL POPULATION; ENTIRE DRAINAGE AFFECTED BY
CATTLE.

County: MADISON

USGS quadrangle: NOBLE PEAK

Township: Range: Section: TRS comments:
002S 003W 32 NW4

Precision: S
Survey date: 1994-08-20 Elevation: 8600 -
First observation: 1994-08-20 Slope/aspect: 0% / NW
Last observation: 1994-08-20 Size (acres): 1

Location:

FROM PONY, FOLLOW ROAD SOUTHWEST OUT OF TOWN UP NORTH WILLOW CREEK,
THEN UP CATARACT CREEK. CONTINUE ON JEEP TRAIL TO MASON LAKE.
POPULATION IS IN DRAINAGE ABOVE MASON LAKE, BELOW UNNAMED LAKE ON
ROUTE TO HOLLOWTOP MOUNTAIN.

Element occurrence data:

>20 PLANTS. 100% IN FRUIT, A FEW WITH INTACT HEADS; MOST PLANTS WITH
DISPERSED FRUIT.

General site description:

WET MEADOW, WILLOW THICKET. OPEN GLACIAL VALLEY. MOIST EARLIER IN
SEASON. ASSOCIATED SPECIES: SALIX PLANIFOLIA, TROLLIUS LAXUS,
VEGETATIVE GRASSES AND SEDGES.

Land owner/manager:

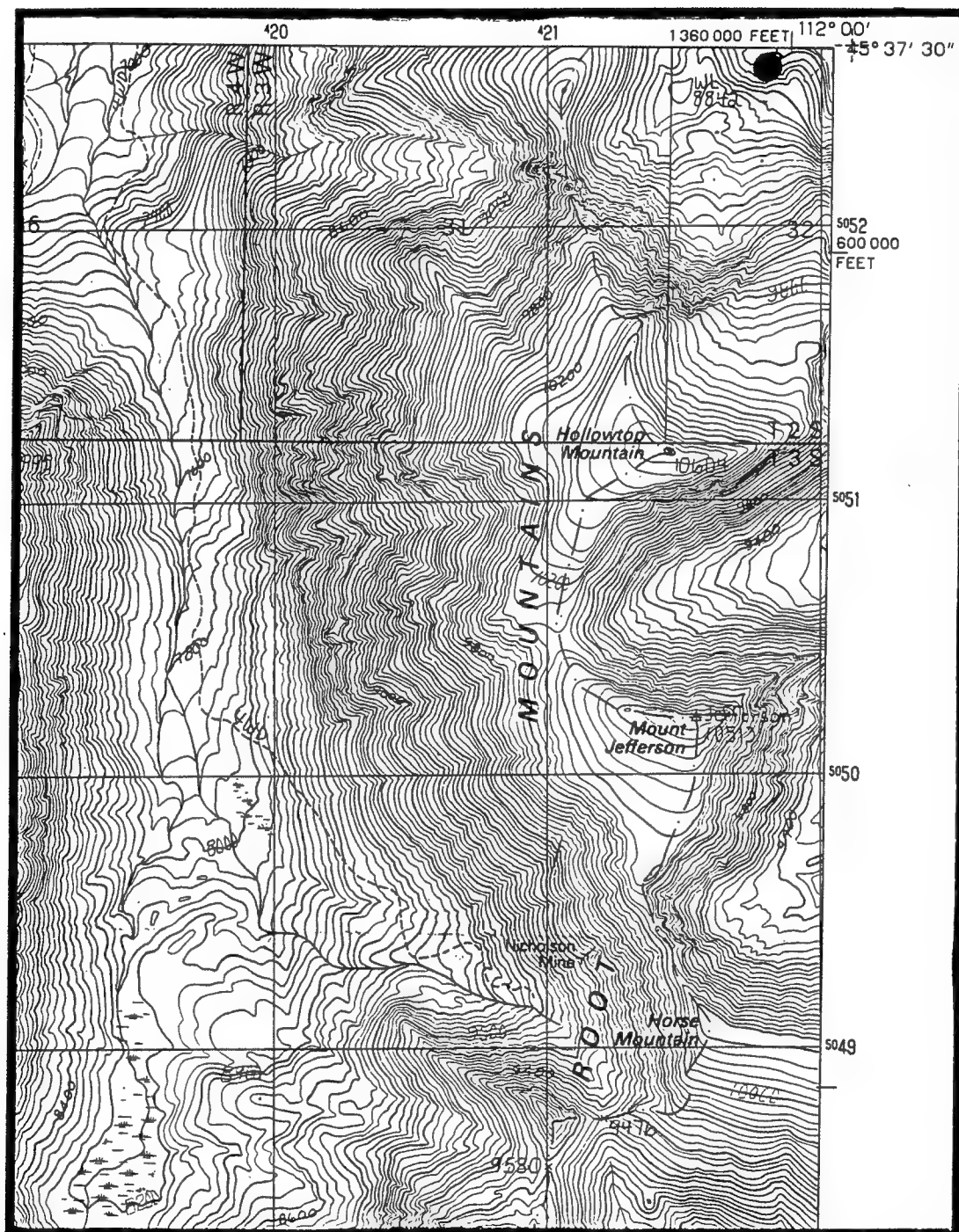
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:

OBSERVED BY J. VANDERHORST. SITE GRAZED EARLY IN SEASON, TRAMPLED.
SITE DRIER THAN WOULD BE NATURALLY DUE TO COMPACTION, STREAM EROSION.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens:



Agoseris lackschewitzii: Hollowtop Mountain (049)
USGS Noble Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.050
Element occurrence type:

Survey site name: MACARONI LAKE
EO rank: B
EO rank comments: RELATIVELY SMALL POPULATION, ATV TRAILS, GRAZING.

County: MADISON

USGS quadrangle: NOBLE PEAK

Township: Range: Section: TRS comments:
003S 004W 35 NE4

Precision: S
Survey date: 1994-08-08 Elevation: 8100 -
First observation: 1994-08-08 Slope/aspect: 0-2% / NW
Last observation: 1994-08-08 Size (acres): 7

Location:
CA. 1.5 MILES WEST OF SHERIDAN ON MILL CREEK ROAD, TURN NORTH ON
INDIAN CREEK ROAD AND FOLLOW TO RED PINE MINE. FROM HERE, POPULATION
IS CA. 2 MILES UP NORTH FORK OF INDIAN CREEK TRAIL, NEAR JUNCTION OF
TRAIL TO HILL RESERVOIR.

Element occurrence data:
EST. 100 PLANTS, 100% IN FRUIT; DISPERSED SEED.

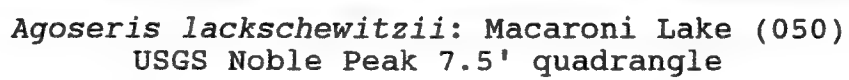
General site description:
DESCHAMPIA CAESPITOSA WET MEADOW. GNEISS, ALLUVIUM PARENT MATERIAL.
SILTY, HIGH OM. ASSOCIATED SPECIES: PICEA ENGELMANII, SENEIO
TRIANGULARIS, ERIGERON PEREGRINUS, ALLIUM SCHOENOPRASM, ASTER
FOLIACEUS, RANUNCULUS ESCHOLTZII.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, SHERIDAN RANGER DISTRICT

Comments:
OBSERVED BY J. VANDERHORST. DISTURBANCE FROM GRAZING, ATV TRAILS NOTED
DESPITE AREA BEING CLOSED TO VEHICLES.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens:



Agoseris lackschewitzii: Macaroni Lake (050)
USGS Noble Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.051
Element occurrence type:

Survey site name: JACKSON LAKE
EO rank: B
EO rank comments:

County: MADISON

USGS quadrangle: NOBLE PEAK

Township: Range: Section: TRS comments:
003S 004W 16 N2

Precision: S
Survey date: 1994-08-07 Elevation: 8350 - 8680
First observation: 1994-08-07 Slope/aspect: LEVEL
Last observation: 1994-08-07 Size (acres): 5

Location:
FROM SHERIDAN, FOLLOW ROAD NORTH 1.5 MILES, THEN NORTHWEST UP
WISCONSIN CREEK CA. 8 MILES TO JACKSON LAKE. PLANTS ARE IN WET MEADOWS
ALONG CREEK AND ON SOUTH SHORE OF LAKE.

Element occurrence data:
EST. <100 PLANTS, 3 SUBPOPULATIONS. 100% IN FRUIT. MATURE FRUIT
PRODUCED, DISPERSED.

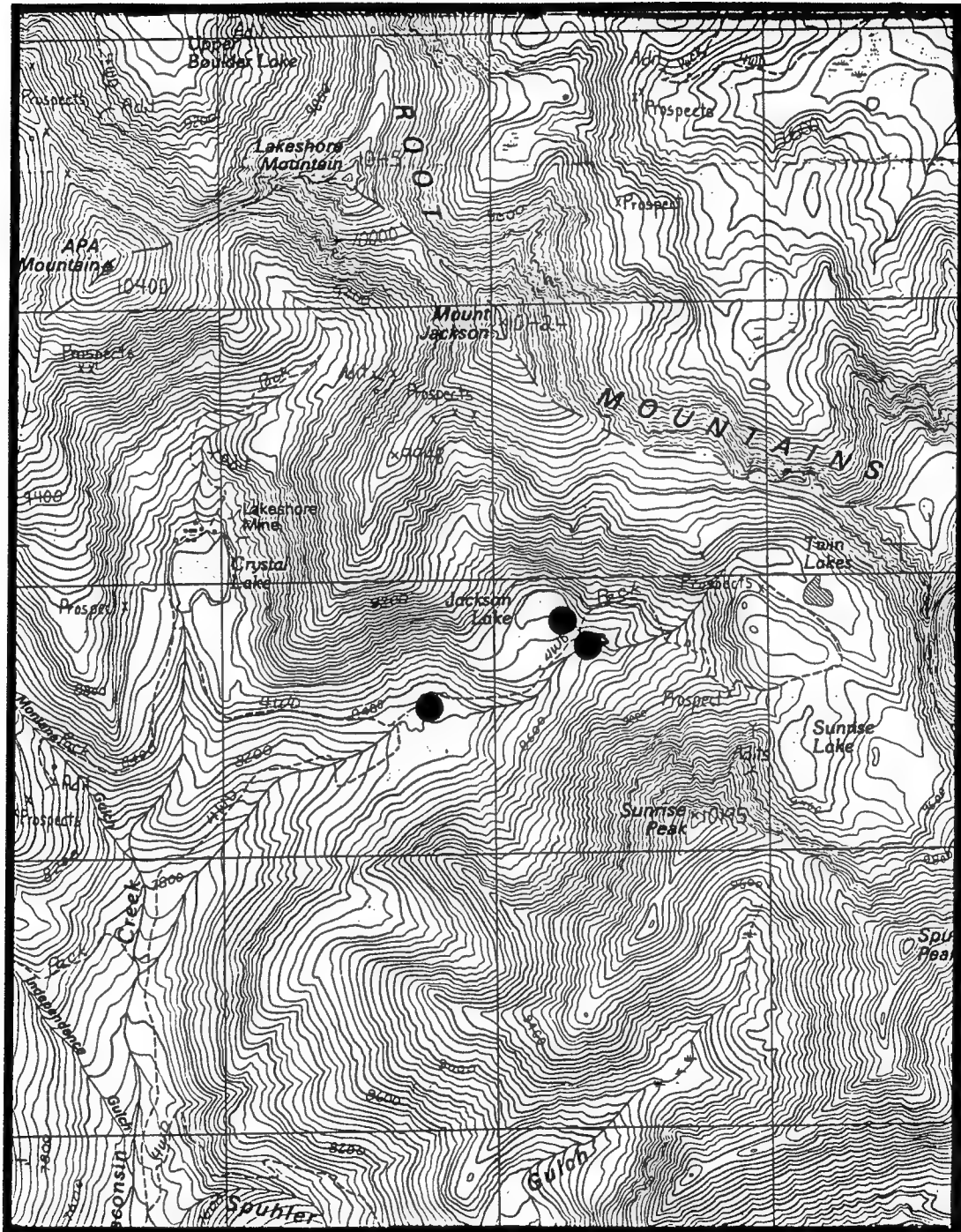
General site description:
SUBALPINE GLACIAL VALLEY, WET MEADOW/FOREST ECOTONE. OPEN TO PARTIAL
SHADE. SATURATED, SILTY SOIL TEXTURE. GNEISS/ALLUVIUM PARENT MATERIAL.
ASSOCIATED SPECIES: PICEA ENGELMANNII, SALIX PLANIFOLIA, DESCHAMPSIA
CAESPITOSA, CAREX SPP., HABENARIA SACCATTA, HABENARIA DILATATA,
SENECIO TRIANGULARIS, TRIFOLIUM REPENS, ERIGERON PERIGRINUS, PHLEUM
ALPINUM, TROLLIUS LAXUS.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, SHERIDAN RANGER DISTRICT

Comments:
OBSERVED BY J. VANDERHORST. EXTENSIVE DAMMING, MINING, GRAZING, AND
LOGGING IN AREA. NO EVIDENCE OF GRAZING AT DATE OF SURVEY.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens: VANDERHORST, J. (5294). 1994. MONT.



Agoseris lackschewitzii: Jackson Lake (051)
USGS Noble Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.052
Element occurrence type:

Survey site name: BOW BASIN
EO rank: A
EO rank comments: UNIQUE HABITAT; FEW SCATTERED PLANTS, SEEMS
PRISTINE.

County: MADISON

USGS quadrangle: NOBLE PEAK

Township: Range: Section: TRS comments:
003S 003W 30 SW4

Precision: S
Survey date: 1994-08-08 Elevation: 8950 -
First observation: 1994-08-08 Slope/aspect: 0% / SW
Last observation: 1994-08-08 Size (acres): 15

Location:
BOW BASIN. ACCESS FROM SHERIDAN VIA MILL CREEK ROAD TO INDIAN CREEK
ROAD. FOLLOW NORTH FORK INDIAN CREEK TRAIL, THEN SIDE TRAIL TO HILL
RESERVOIR. FOLLOW DRAINAGE UP FROM RESERVOIR NORTHWEST CA. 1 MILE.

Element occurrence data:
<50 PLANTS. 100% IN FRUIT; DISPERSED SEED. FEW, SCATTERED PLANTS.

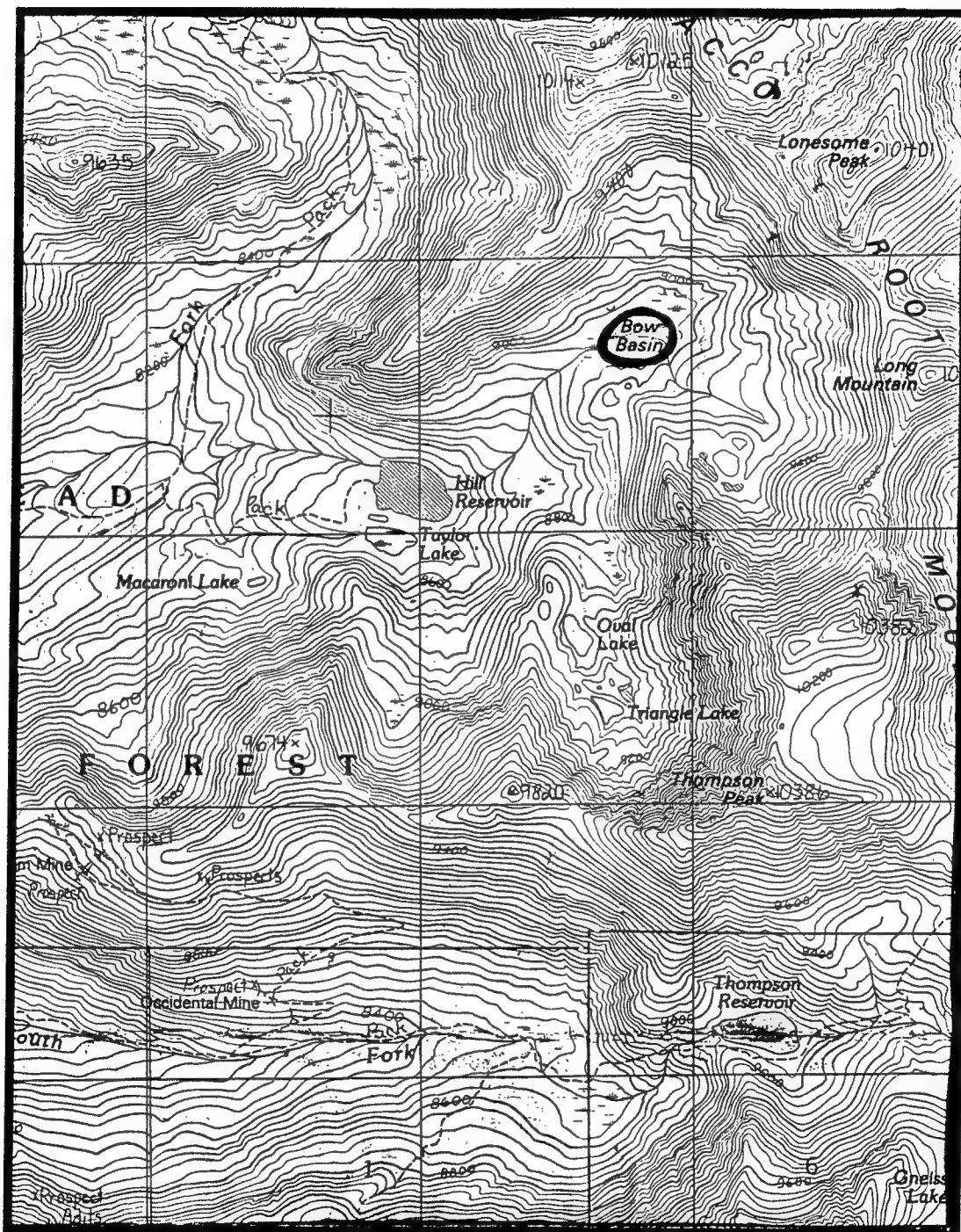
General site description:
WET MEADOW, WILLOW THICKETS. OPEN, SILTY SOILS, GNEISS PARENT
MATERIAL. ASSOCIATED SPECIES: SALIX WOLFII, TRISETUM WOLFII,
DESCHAMPSIA CAESPITOSA, GENTIANA CALYCOSA, AGOSERIS GLAUCA, CAREX
ATRATA, ASTER FOLIACEUS.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, SHERIDAN RANGER DISTRICT

Comments:
OBSERVED BY J. VANDERHORST.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens: VANDERHORST, J. (5302). 1994. MONT.



Agoseris lackschewitzii: Bow Basin (052)
USGS Noble Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.053
Element occurrence type:

Survey site name: NOBLE LAKE
EO rank: A
EO rank comments: LARGE POPULATION OVER BROAD ELEVATION RANGE; HIGH
ELEVATION RANGE PRISTINE, WELL-PROTECTED.

County: MADISON

USGS quadrangle: NOBLE PEAK

Township: Range: Section: TRS comments:
003S 004W 22 NE4,SW4

Precision: S
Survey date: 1994-08-07 Elevation: 8360 - 9360
First observation: 1994-08-07 Slope/aspect: 0-5% / S-SW
Last observation: 1994-08-07 Size (acres): 50

Location:
UPPER NOBLE FORK DRAINAGE, BOTH ABOVE AND BELOW NOBLE LAKE. ACCESS
FROM SHERIDAN, UP NOBLE FORK ROAD.

Element occurrence data:
CA. 1000+ PLANTS, 4 SUBPOPULATIONS. 100% FRUITING; MANY HEADS WITH
DISPERSED SEED.

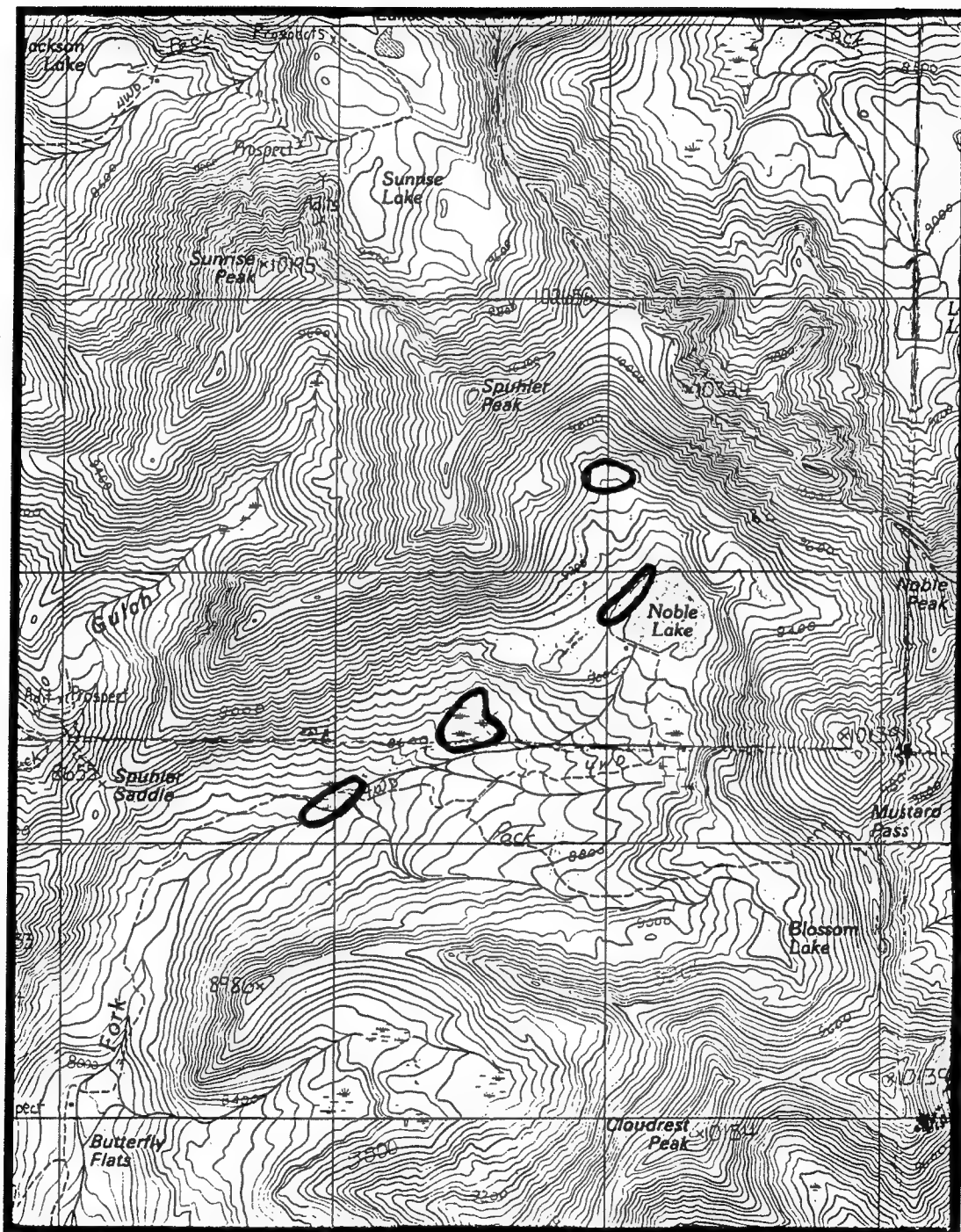
General site description:
SUBALPINE GLACIAL VALLEY. SILTY, SATURATED BOWLS AND BOTTOMS, WET
MEADOWS. ASSOCIATED SPECIES: PHYLLODOCE EMPETRIFORMIS, PICEA
ENGELMANII, CAREX SPP., JUNCUS SPP., PINUS ALBICAULIS, GENTIANA
CALYCOSA, POLYGONUM BISTORTOIDES, TOEFIELDIA GLUTINOSA, ANGELICA
ARGENTA, PARNASSIA FIMBRIATA, CALTHA LEPTOSEPALA.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, SHERIDAN RANGER DISTRICT

Comments:
OBSERVED BY J. VANDERHORST. NOT GRAZED YET THIS YEAR; GRAZING HISTORY
UNKNOWN; WEEDS ABUNDANT ON DRYER HILLSIDES IN VICINITY.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens: VANDERHORST, J. (5300). 1994. MONT.



Agoseris lackschewitzii: Noble Lake (053)
USGS Noble Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.054
Element occurrence type:

Survey site name: THOMPSON RESERVOIR
EO rank: B
EO rank comments: SMALL POPULATION, ADJACENT POTENTIAL HABITAT
HEAVILY GRAZED.

County: MADISON

USGS quadrangle: NOBLE PEAK

Township: Range: Section: TRS comments:
004S 003W 6 NE4

Precision: S
Survey date: 1994-08-08 Elevation: 9100 -
First observation: 1994-08-08 Slope/aspect: 0-5% / SOUTH
Last observation: 1994-08-08 Size (acres): 2

Location:

FROM SHERIDAN, FOLLOW MILL CREEK ROAD, THEN INDIAN CREEK ROAD TO RED
PINE MINE. WALK FROM HERE UP SOUTH FORK INDIAN CREEK TO HEADWATERS.
PLANTS ARE IN MEADOW CA. 0.5 MILE ABOVE THOMPSON RESERVOIR.

Element occurrence data:

>50 PLANTS, 100% IN FRUIT; DISPERSED FRUIT.

General site description:

WET MEADOW, GLACIAL VALLEY BOTTOM, GNEISS PARENT MATERIAL. ASSOCIATED
SPECIES: SALIX WOLFII, DESCHAMPSIA CAESPITOSA, ERIGERON PERIGRINUS,
TROLLIUS LAXUS, CALTHA LEPTOSEPALA, ALLIUM SCHOENOPRASM.

Land owner/manager:

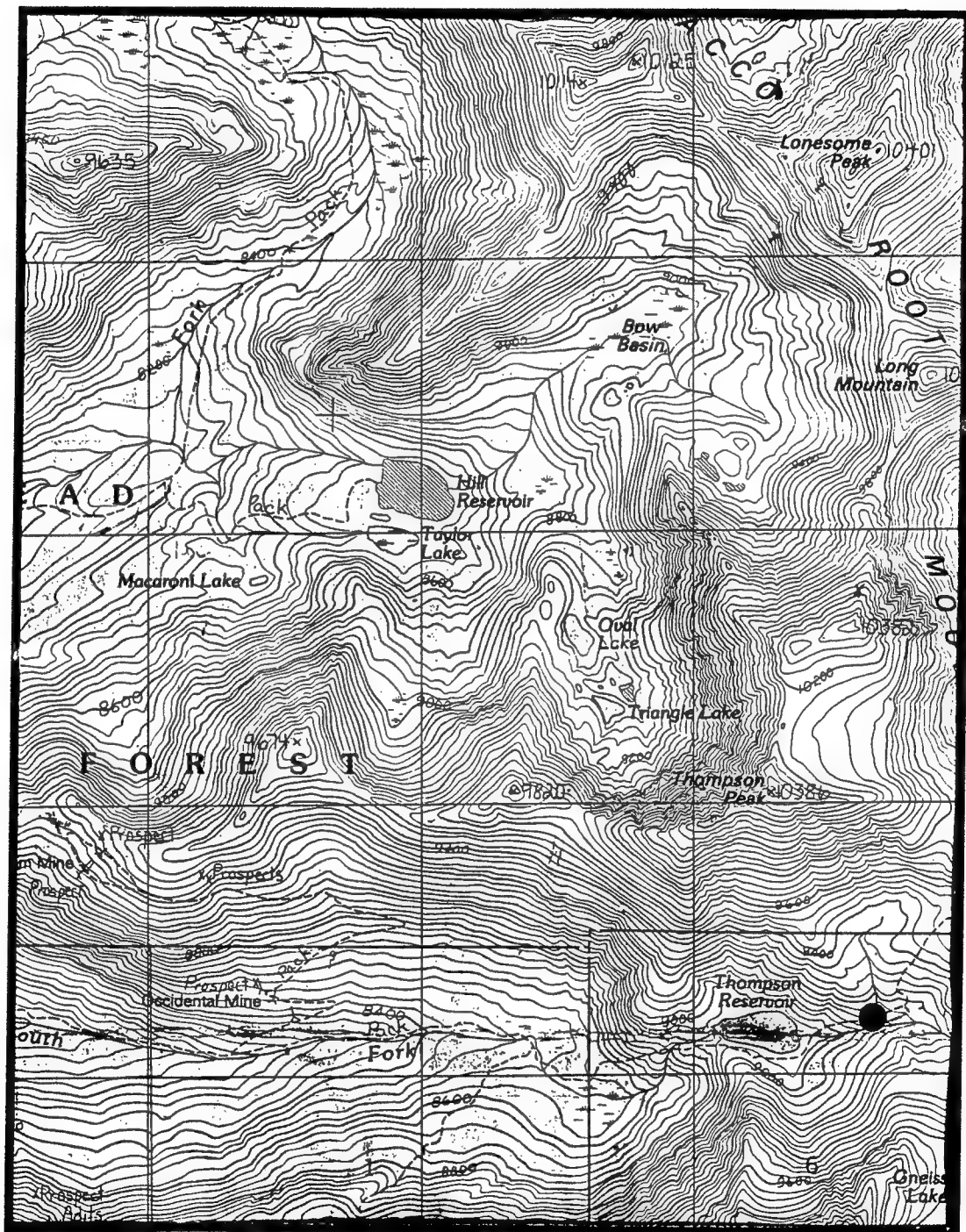
BEAVERHEAD NATIONAL FOREST, SHERIDAN RANGER DISTRICT

Comments:

OBSERVED BY J. VANDERHORST. CATTLE IN DRAINAGE; POTENTIAL HABITAT
BELOW RESERVOIR HEAVILY GRAZED.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens:



Agoseris lackschewitzii: Thompson Reservoir (054)
USGS Noble Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.055
Element occurrence type:

Survey site name: TWIN LAKES
EO rank: B
EO rank comments: POTHOLE HABITAT DISTURBED; POPULATION NUMBERS ARE
SMALL.

County: MADISON

USGS quadrangle: POTOSI PEAK

Township: Range: Section: TRS comments:
004S 003W 2 SE4; 12 NE4

Precision: S
Survey date: 1994-08-10 Elevation: 7550 - 8300
First observation: 1994-08-10 Slope/aspect: LEVEL
Last observation: 1994-08-10 Size (acres): 3

Location:

FROM MCALLISTER, FOLLOW NORTH MEADOW CREEK ROAD TO TRAIL TO TWIN
LAKES. SUBPOPULATIONS ARE JUST TO NORTH OF LOWER TWIN LAKE, AND AROUND
POTHOLE ALONG TRAIL BETWEEN UPPER TWIN LAKE AND NEW DEAL MINE, ALSO
ALONG TRAIL CA. 1.5 MILES BELOW LOWER TWIN LAKE IN WET SPRUCE WOODS.

Element occurrence data:

EST. <50 PLANTS, 2 SUBPOPULATIONS. 100% FRUITING; DISPERSED FRUIT.

General site description:

OPEN TO PARTIALLY SHADED GLACIAL LAKE BASIN. SATURATED BOTTOM.
ASSOCIATED SPECIES: SALIX WOLFII, PICEA ENGELMANII, SEDGES
(COLLECTED), ALNUS VIRIDIS, SWERTIA PERENNIS, CASTILLEJA MINIATA,
PEDICULARIS GROENLANDICA.

Land owner/manager:

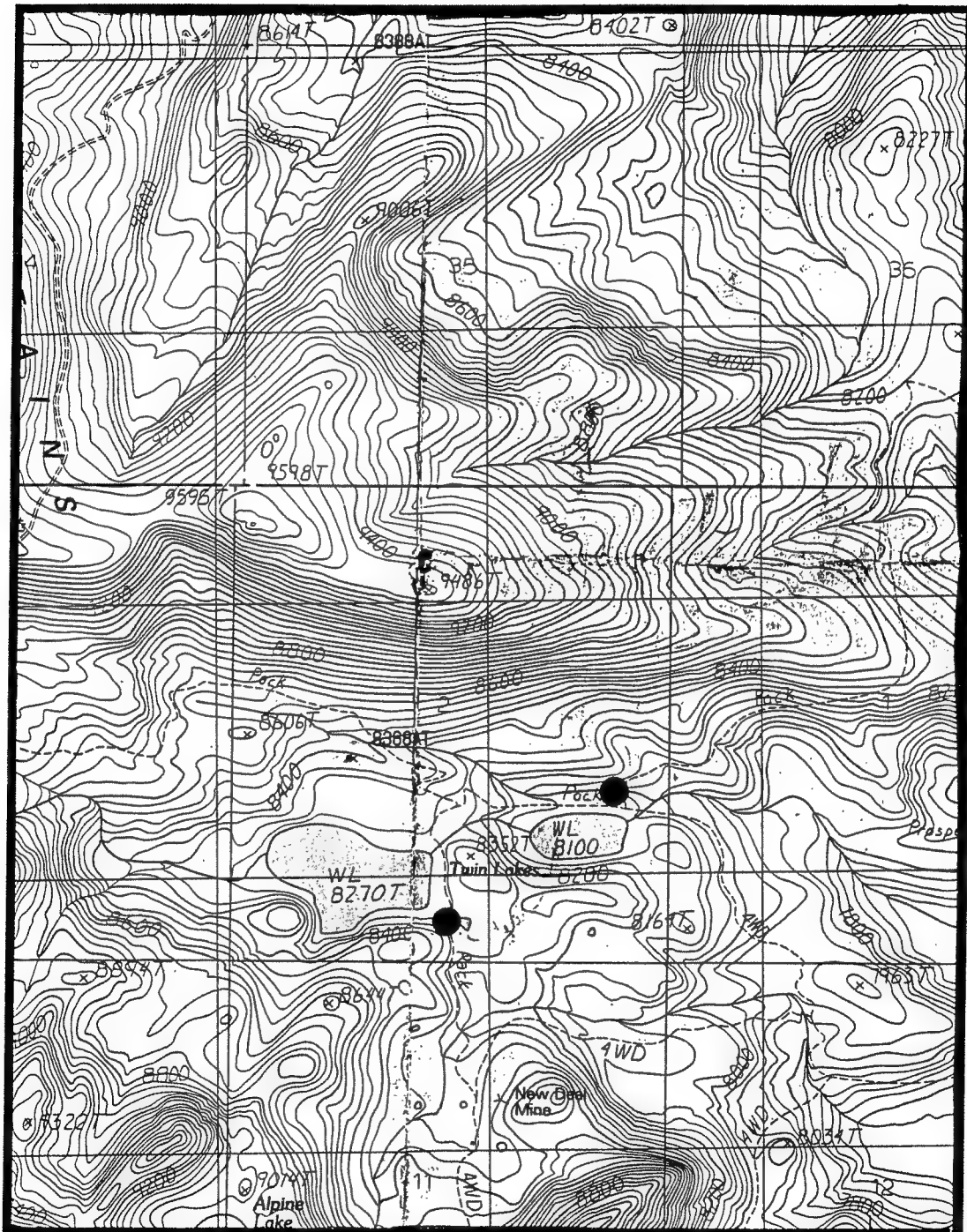
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:

OBSERVED BY VANDERHORST. GRAZING AND ATV TRAFFIC THREATEN NATIVE WET
MEADOW HABITATS IN THE AREA.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens:



Agoseris lackschewitzii: Twin Lakes (055)
USGS Potosi Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.056
Element occurrence type:

Survey site name: NORTH MEADOW CREEK
EO rank: C
EO rank comments: ONLY 1 PLANT; HEAVY RECREATIONAL USE.

County: MADISON

USGS quadrangle: POTOSI PEAK

Township: Range: Section: TRS comments:
003S 002W 31 NE4; 32 NW4

Precision: S
Survey date: 1994-08-09 Elevation: 6650 -
First observation: 1994-08-09 Slope/aspect: LEVEL
Last observation: 1994-08-09 Size (acres):

Location:
FROM MCALLISTER, FOLLOW NORTH MEADOW CREEK ROAD CA. 2 MILES PAST USFS
BOUNDARY. SITE IS WET AREA AROUND BEAVER PONDS BELOW ROAD.

Element occurrence data:
1 PLANT FOUND IN FLOWER (A FEW OTHERS, POSSIBLY, ALREADY BEYOND
IDENTIFICATION WITH DISPERSED FRUIT).

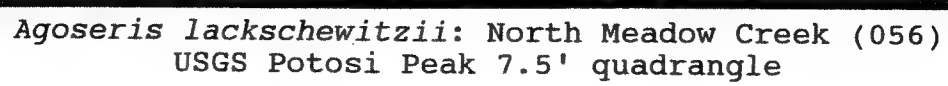
General site description:
VALLEY BOTTOM. PARTIAL SHADE. SATURATED, SILTY. ASSOCIATED SPECIES:
CALAMAGROSTIS CANADENSIS, SALIX LEMMONII, CAREX UTRICULATA, CAREX
AQUATILIS, ASTER MODESTUS, ANGELICA ARGUTA, CIRSIUM ARVENSE.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:
OBSERVED BY J. VANDERHORST. EVIDENCE OF DISTURBANCE: BEAVER DAM,
CAMPSITE, FISHING TRAILS. SITE IS UNIQUE IN ITS PHENOLOGY: ONLY PLANT
SEEN IN FLOWER IN TOBACCO ROOTS IN 1994 (AUGUST); ALL OTHERS WERE IN
FRUIT.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens: VANDERHORST, J. (5307). 1994. MONT.



Agoseris lackschewitzii: North Meadow Creek (056)
USGS Potosi Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.057
Element occurrence type:

Survey site name: POTOSI CREEK
EO rank: D
EO rank comments: FEW PLANTS, WETLANDS DEGRADED BY GRAZING.

County: MADISON

USGS quadrangle: POTOSI PEAK

Township: Range: Section: TRS comments:
003S 003W 2 NW4

Precision: M
Survey date: 1994-08-04 Elevation: 7700 -
First observation: 1994-08-04 Slope/aspect: LEVEL
Last observation: 1994-08-04 Size (acres):

Location:
POTHOLE BASIN BETWEEN NORTH AND SOUTH WILLOW CREEKS, CA. 4 AIR MILES
SOUTHWEST OF PONY. CAN BE REACHED BY TRAILS FROM EITHER DRAINAGE.

Element occurrence data:
13 PLANTS COUNTED. 100% IN FRUIT; MATURE FRUIT PRODUCED.

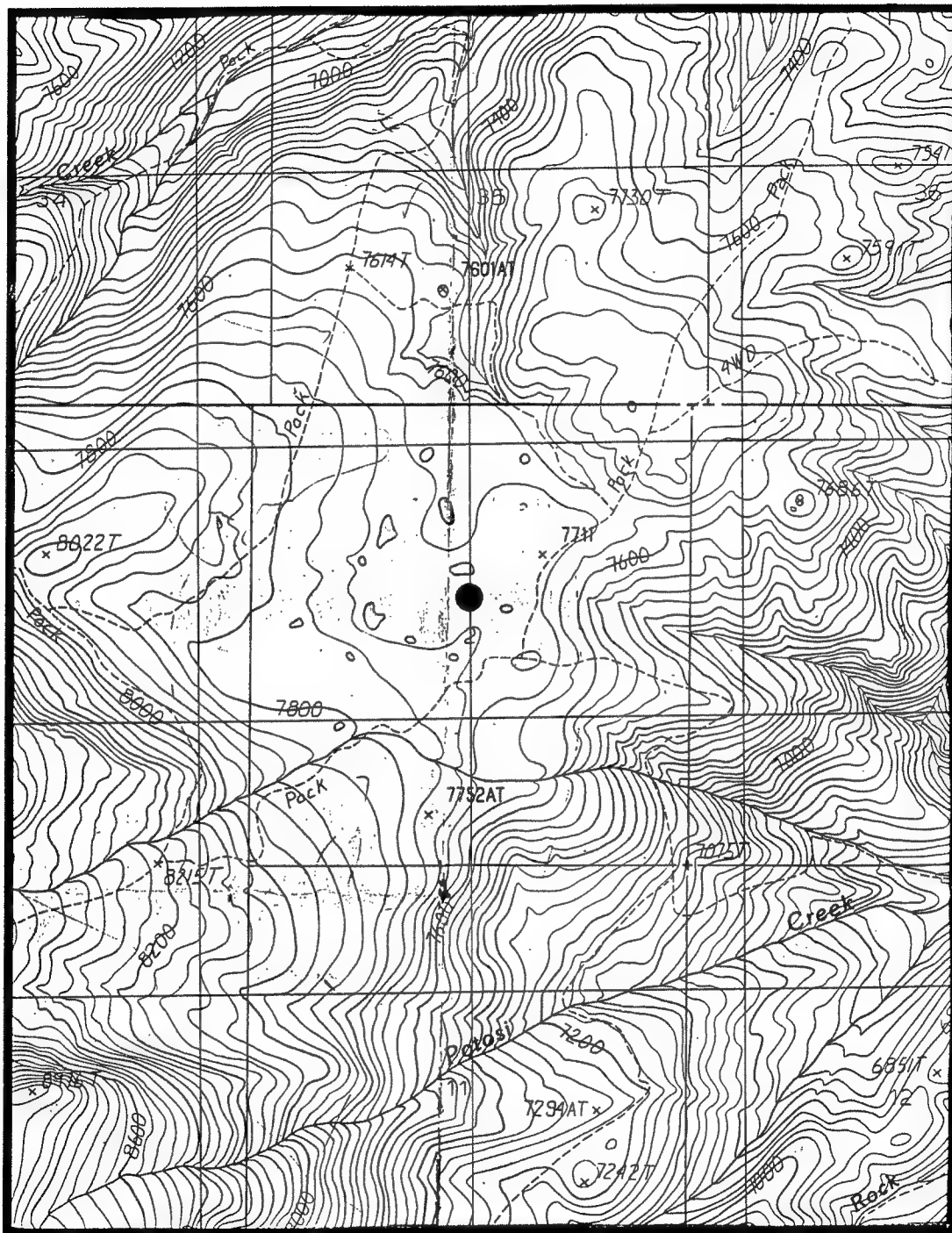
General site description:
SATURATED, PARTIALLY SHADED UPLAND GLACIAL POTHOLE BASIN. ASSOCIATED
SPECIES: PINUS CONTORTA, PICEA ENGELMANII, LUZULA CAMPESTRIS, VERONICA
SERPYLLIFOLIA, RANUNCULUS FLAMMULA, ERIGERON PERIGRINUS, EPILOBIUM
ANAGALLIDIFOLIUM.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:
OBSERVED BY J. VANDERHORST. PRECISION TO 1/4 SECTION ONLY, DUE TO
"HUMMOCKY" TOPOGRAPHY; AREA HEAVILY GRAZED IN 1994; LONG-TERM RESPONSE
TO GRAZING UNKNOWN.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens: VANDERHORST, J. (5292). 1994. MONT.



Agoseris lackschewitzii: Potosi Creek (057)
USGS Potosi Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: AGOSERIS LACKSCHEWITZII
Common Name: PINK AGOSERIS

Global rank: G3 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDAST090C0.058
Element occurrence type:

Survey site name: UPPER SOUTH BOULDER
EO rank: B
EO rank comments:

County: MADISON

USGS quadrangle: NOBLE PEAK

Township: Range: Section: TRS comments:
003S 004W 11 NW4NW4; SE4NW4

Precision: S
Survey date: 1994-08-15 Elevation: 8270 -
First observation: 1994-08-15 Slope/aspect: LEVEL
Last observation: 1994-08-15 Size (acres): 1

Location:
TOBACCO ROOT MOUNTAINS SOUTHWEST OF MAMMOTH, CA. 2 MILES SOUTH OF LOST
CABIN TRAILHEAD (#150).

Element occurrence data:
OVER 60 RAMETS IN TWO SUBPOPULATIONS; EXCELLENT CONDITION IN
CONCENTRATED PATCHES WITH OTHERWISE SUITABLE HABITAT. IN FRUIT 14 AUG
1994.

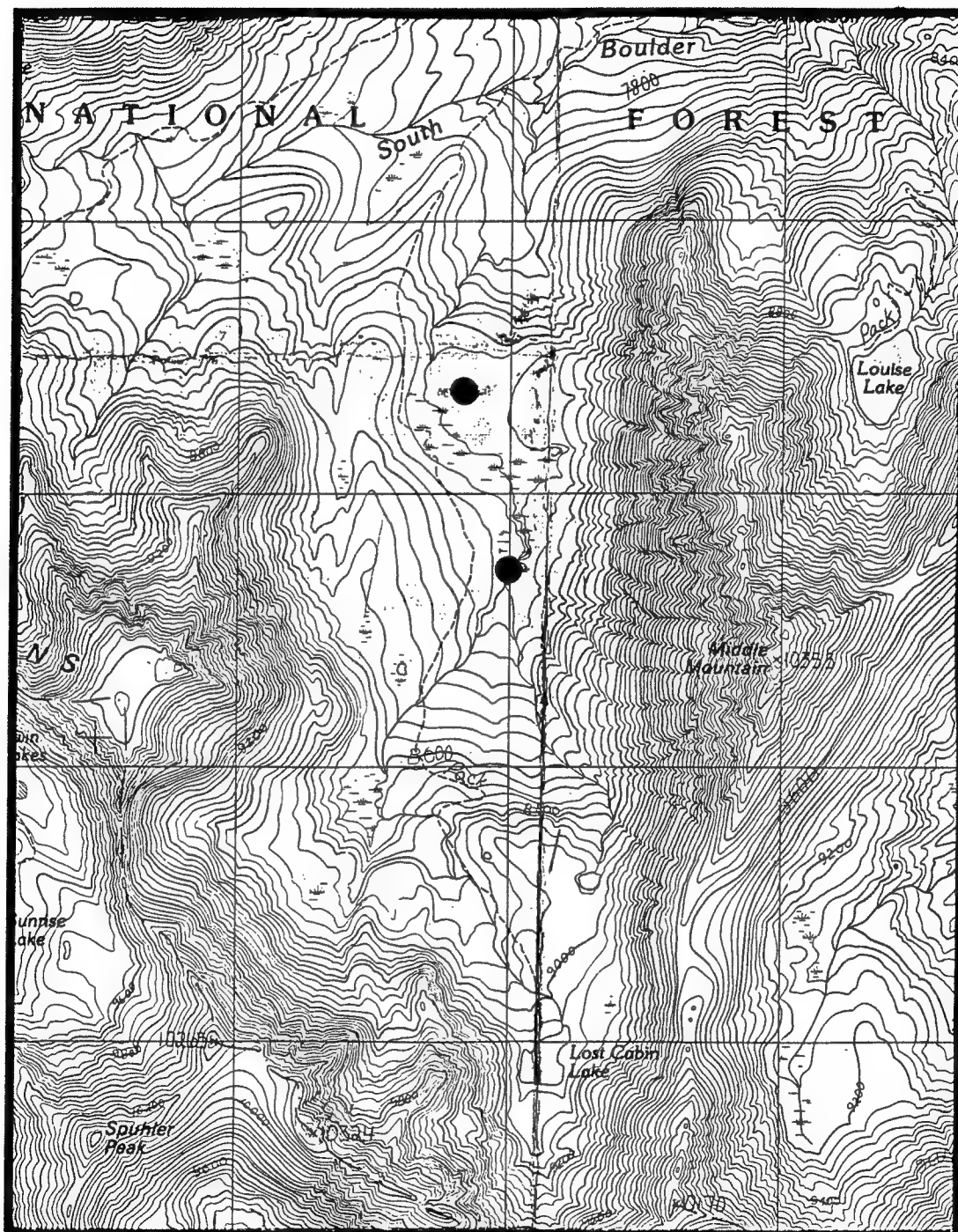
General site description:
LARGE MEADOW COMPLEX IN VALLEY FLANKED BY STEEP MOUNTAIN SLOPES.
DOMINANTS INCLUDE DESCHAMPSIA CAESPITOSA AND CAREX PRAEGRACILIS. OTHER
ASSOCIATED SPECIES INCLUDE CAREX AGNATILIS, JUNCUS PARRYI, SENECIO
TRIANGULARIS, CAREX SARTWELLII, CAREX NEBRASCENSIS.

Land owner/manager:
DEERLODGE NATIONAL FOREST, JEFFERSON RANGER DISTRICT

Comments:

Information source:

Specimens:



Agoseris lackschewitzii: Upper South Boulder (058)
USGS Noble Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: CAREX NEUROPHORA
Common Name: ALPINE-NERVED SEDGE

Global rank: G4 Forest Service status:
State rank: S1 Federal Status:

Element occurrence code: PMCYP03980.007
Element occurrence type:

Survey site name: TWIN LAKES
EO rank: B
EO rank comments: HIGH DIVERSITY OF SEDGES; MOST HABITAT IN RANGE IS
HEAVILY GRAZED.

County: MADISON

USGS quadrangle: POTOSI PEAK

Township: Range: Section: TRS comments:
004S 003W 2 S2

Precision: S
Survey date: 1994-08-10 Elevation: 8300 -
First observation: 1994-08-10 Slope/aspect: LEVEL
Last observation: 1994-08-10 Size (acres):

Location:
TOBACCO ROOT MOUNTAINS, TWIN LAKE BASIN, AROUND POTHOLE 0.25 MILE
SOUTHEAST OF UPPER TWIN LAKE, ALONG TRAIL TO NEW DEAL MINE. CA. 15 AIR
MILES NORTHWEST OF ENNIS.

Element occurrence data:
FRUITING; MATURE FRUIT PRESENT.

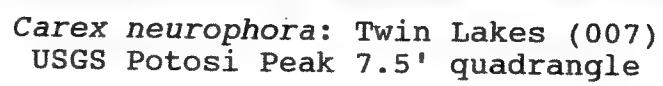
General site description:
OPEN GLACIAL LAKE BASIN; BOTTOM; SATURATED. ASSOCIATED SPECIES: SALIX
WOLFII, CAREX AQUATILIS, CAREX PRAECEPTORUM, CAREX SCOPULORUM,
AGOSERIS LACKSCHEWITZII, PEDICULARIS GROENLANDICA.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:
OBSERVED BY J. VANDERHORST. SITE IN GOOD SHAPE BUT MUCH OF HABITAT IN
TOBACCO ROOTS IS HEAVILY GRAZED. TRAIL SKIRTS POPULATION. NOT FULLY
SURVEYED.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens: VANDERHORST, J. (5311). 1994. MONT.



Carex neurophora: Twin Lakes (007)
USGS Potosi Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: CAREX NEUROPHORA
Common Name: ALPINE-NERVED SEDGE

Global rank: G4 Forest Service status:
State rank: S1 Federal Status:

Element occurrence code: PMCYP03980.008
Element occurrence type:

Survey site name: MASON LAKE
EO rank: C
EO rank comments: UNIQUE WETLAND SUFFERING FROM GRAZING. POTENTIAL
HABITAT IS EXTENSIVE.

County: MADISON

USGS quadrangle: PONY

Township: Range: Section: TRS comments:
002S 003W 29 SE4

Precision: S
Survey date: 1994-08-20 Elevation: 8260 - 8360
First observation: 1994-08-20 Slope/aspect: LEVEL
Last observation: 1994-08-20 Size (acres):

Location:
TOBACCO ROOT MOUNTAINS, MASON LAKE BASIN. CA. 5 AIR MILES SOUTHWEST OF
PONY. ACCESS FROM PONY VIA GRAVEL ROADS UP NORTH WILLOW CREEK, THEN UP
CATARACT CREEK.

Element occurrence data:
SCARCE; <50 FLOWERING STEMS; RELATIVE ABUNDANCE OF SEDGE UNKNOWN.
MATURE FRUIT PRESENT, NOT RECOGNIZED VEGETATIVELY.

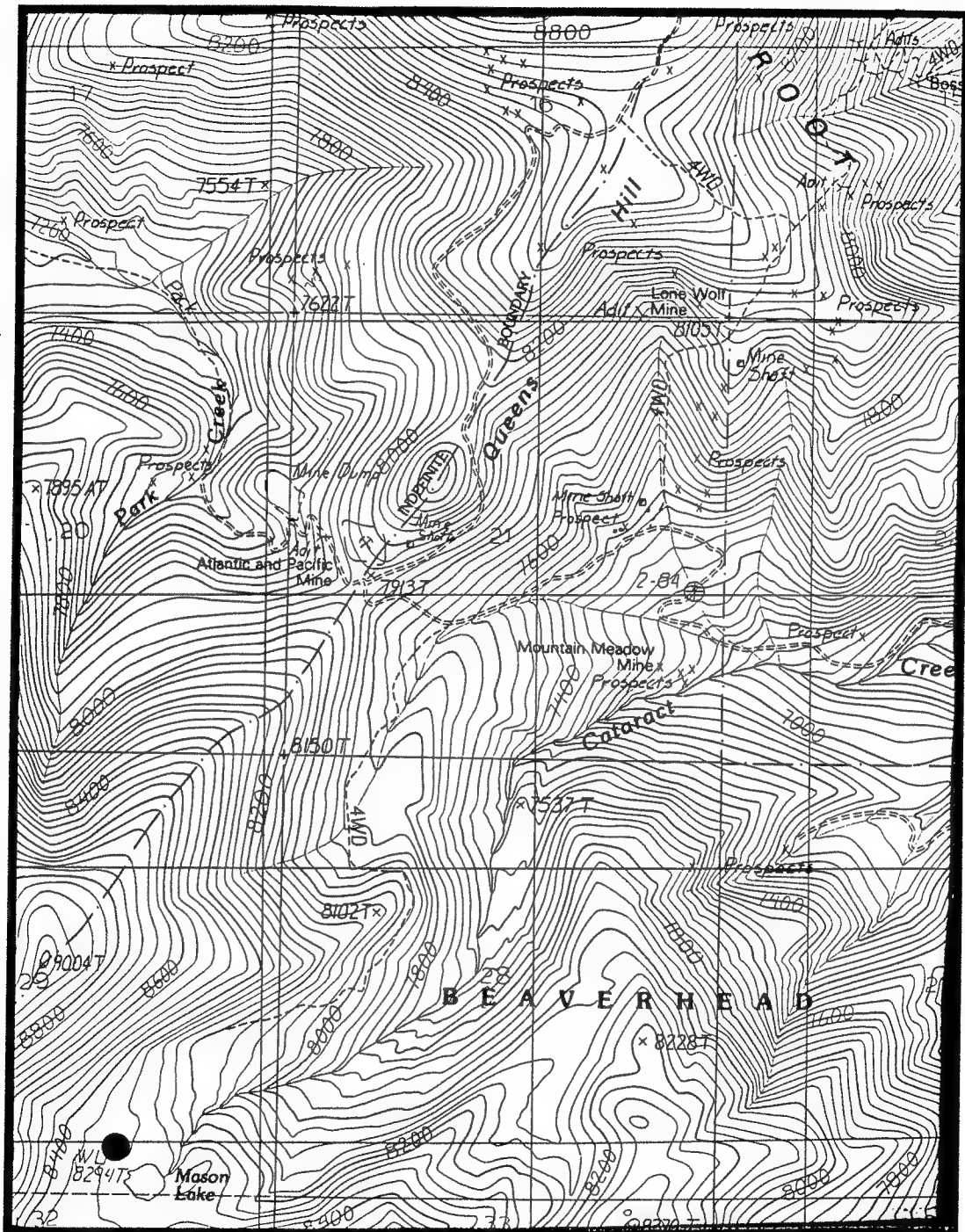
General site description:
WET THICKETS AND MEADOW. OPEN, SATURATED BOTTOM. ASSOCIATED SPECIES:
SALIX WOLFII, SALIX PLANIFOLIA, POTENTILLA FRUITICOSA, PICEA
ENGELMANNII, CAREX AQUATILIS, PEDICULARIS GROENLANDICA, SWERTIA
PERENIS, ASTER FOLIACEUS, EQUISETUM ARVENSE, JUNCUS REGELII.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:
OBSERVED BY J. VANDERHORST: CATTLE DROPPINGS; HUMMOCKY GROUND PROBABLY
GRAZED EARLIER IN THE YEAR. POTENTIAL HABITAT EXTENSIVE. LATE IN
SEASON WHEN GRAMINOIDS SHOULD HAVE BEEN IN FRUIT, VERY LITTLE
REPRODUCTION SEEN.

Information source: SENSITIVE PLANT COORDINATOR, BEAVERHEAD NATIONAL
FOREST, 610 NORTH MONTANA STREET, DILLON, MT
59725.

Specimens: VANDERHORST, J. (5347). 1994. MONT.



Carex neurophora: Mason Lake (008)
USGS Pony 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: CAREX NEUROPHORA
Common Name: ALPINE-NERVED SEDGE

Global rank: G4 Forest Service status:
State rank: S1 Federal Status:

Element occurrence code: PMCYP03980.009
Element occurrence type:

Survey site name: JACKSON LAKE
EO rank: A
EO rank comments:

County: MADISON

USGS quadrangle: NOBLE PEAK

Township: Range: Section: TRS comments:
003S 004W 16 NW4

Precision: S
Survey date: 1994-08-07 Elevation: 8350 -
First observation: 1994-08-07 Slope/aspect: LEVEL
Last observation: 1994-08-07 Size (acres): 5

Location:
TOBACCO ROOT MOUNTAINS. MEADOWS ALONG TRIBUTARY OF WISCONSIN CREEK,
CA. 0.5 MILE DOWSTREAM FROM JACKSON LAKE. CA. 10 AIR MILES NORTHEAST
OF SHERIDAN.

Element occurrence data:
1000+ INDIVIDUALS; MATURE PERIGINIA PRESENT. SPECIES SUBDOMINANT IN
WET MEADOW.

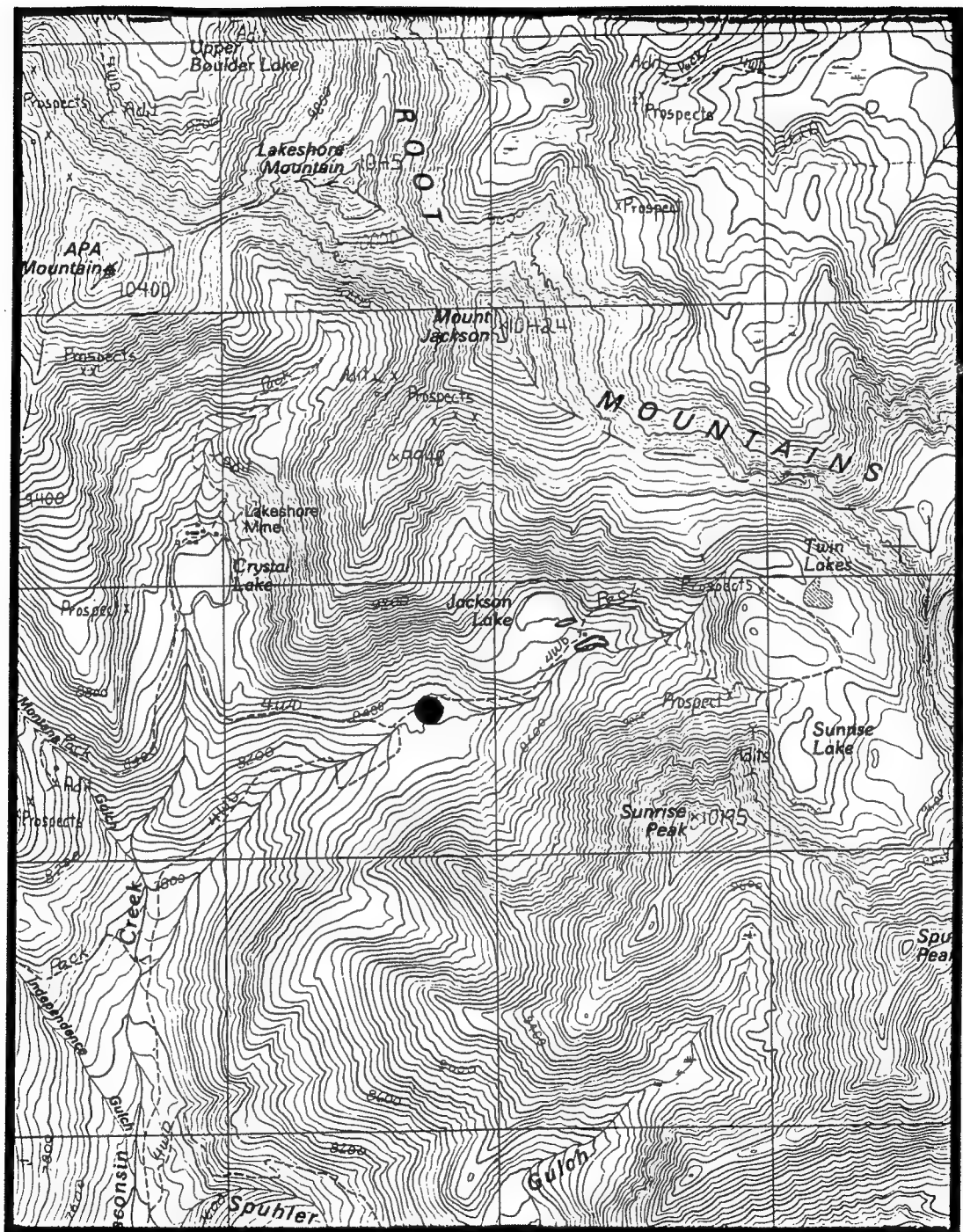
General site description:
SUBALPINE GLACIAL VALLEY. WET MEADOW/FOREST ECOTONE. OPEN TO PARTIAL
SHADE, SATURATED BOTTOM. SILTY, GNEISS/ALLUVIUM PARENT MATERIAL.
ASSOCIATED SPECIES: PICEA ENGELMANNII, SALIX PLANIFOLIA, DESCHAMPSIA
CAESPITOSA, AGOSERIS LACKSCHEWITZII, HABENARIA SACCATTA, HABENARIA
DILATATA, SENEIO TRIANGULARIS, TRIFOLIUM REPENS, TROLLIUS LAXUS.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, SHERIDAN RANGER DISTRICT

Comments:
OBSERVED BY J. VANDERHORST. IMPOUNDMENT OF ZIEGLER RESERVOIR COULD
THREATEN THIS OCCURRENCE ALONG WITH AGOSERIS LACKSCHEWITZII. MUCH OF
HABITAT IS HIGHLY GRAZED. AREA NOT FULLY SURVEYED.

Information source: VANDERHORST, J. [BOTANIST]. 1515 LAKE STREET,
OGDEN, UTAH 84401.

Specimens: VANDERHORST, J. (5295). 1994. MONT.



Carex neurophora: Jackson Lake (009)
 USGS Noble Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: CASTILLEJA GRACILLIMA
Common Name: SLENDER PAINTBRUSH

Global rank: G3G4 Forest Service status: SENSITIVE
State rank: S1 Federal Status:

Element occurrence code: PDSCROD150.006
Element occurrence type:

Survey site name: SHERIDAN
EO rank:
EO rank comments:

County: MADISON

USGS quadrangle: SHERIDAN

Township: Range: Section: TRS comments:
004S 005W 26

Precision:	G	
Survey date:	1892-07-08	Elevation: 5160 -
First observation:	1892	Slope/aspect:
Last observation:	1892-07-08	Size (acres): 0

Location:
SHERIDAN.

Element occurrence data:
UNKNOWN.

General site description:
UNKNOWN.

Land owner/manager:
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:
SPECIMEN NOT DETERMINABLE--S. MATTHEWS 8-19-1994.

Information source: BOTANIST, MONTANA NATURAL HERITAGE PROGRAM, 1515
EAST SIXTH AVENUE, HELENA, MT 59620-1800.

Specimens: FITCH, H. M. (S.N.). 1892. SPECIMEN #2769. MONT. ! F.W.
PENELL, 1948.

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: ELEOCHARIS ROSTELLATA
Common Name: BEAKED SPIKERUSH

Global rank: G5 Forest Service status:
State rank: S1 Federal Status:

Element occurrence code: PMCYP091P0.004
Element occurrence type:

Survey site name: POTOSI HOT SPRINGS
EO rank: B
EO rank comments: FAIRLY EXTENSIVE POPULATION; FEW WEEDS, REMOTE
AREA.

County: MADISON

USGS quadrangle: POTOSI PEAK

Township: Range: Section: TRS comments:
003S 002W 07 SW4

Precision: S
Survey date: 1990-07-18 Elevation: 6100 -
First observation: 1990 Slope/aspect: 0-3% - EAST, SOUTHEAST
Last observation: 1990-07-18 Size (acres):

Location:
CA. 20 AIR MILES NORTHWEST OF ENNIS; CA. 1.5 MILES NORTHEAST OF POTOSI
CAMPGROUND ON F.S. ROAD #160.

Element occurrence data:
1001-10,000 RAMETS IN FLOWER AND FRUIT.

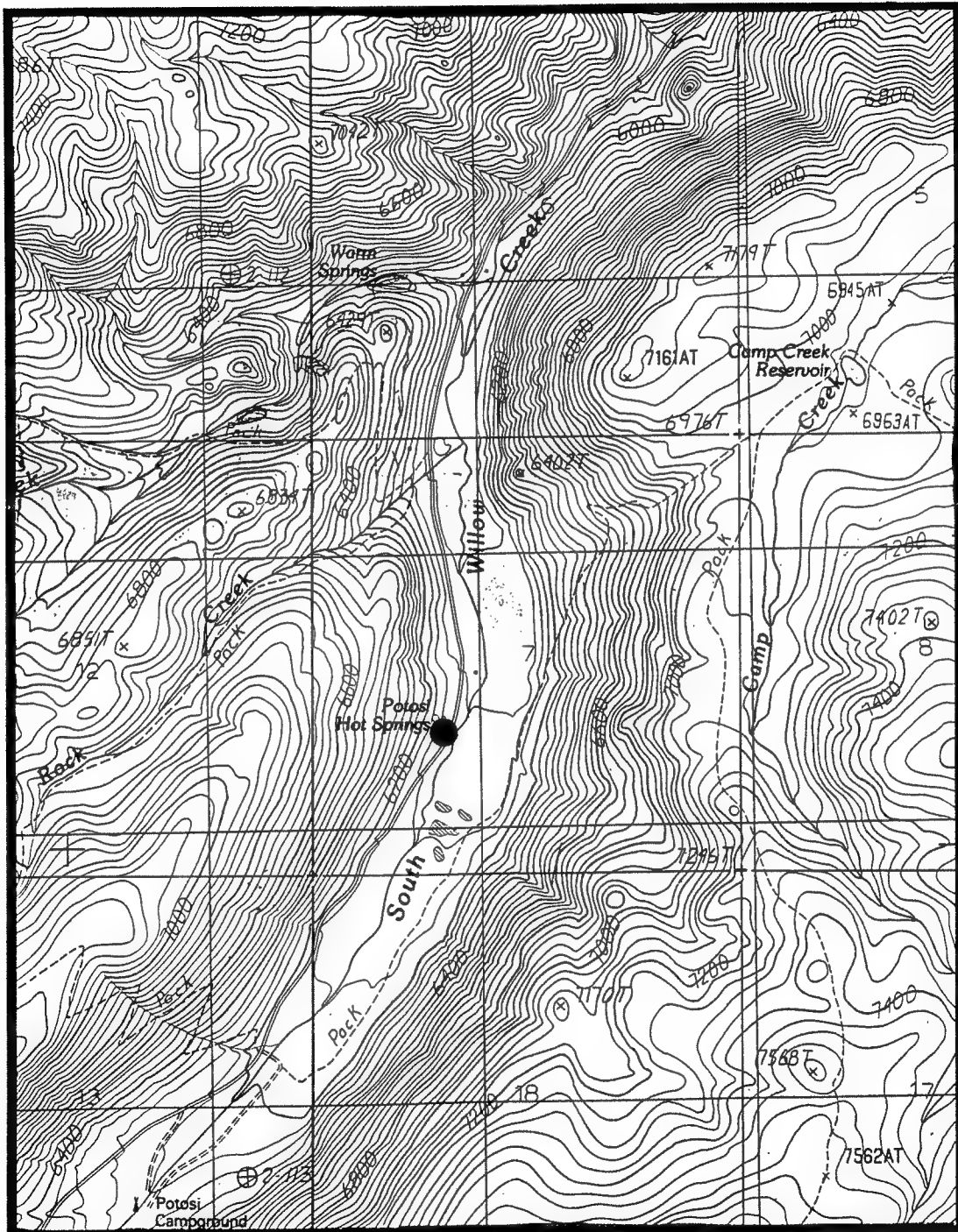
General site description:
ELEOCHARIS ROSTELLATA COMMUNITY. ASSOCIATED SPECIES: MIMULUS GUTTATUS,
TRIGLOCHIN MARITIMUM, SPIRANTHES ROMANZOFFIANA, PARNASSIA PARVIFLORA,
ELEOCHARIS PALUSTRIS.

Land owner/manager:
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:
DEVELOPMENT OF HOT SPRINGS AND PIPING OF WATER WOULD DESTROY UNIQUE
FEATURES. UPLAND COMMUNITIES ARE WEEDY. SITE SURVEY SUMMARY ON FILE AT
MTNHP.

Information source: LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812.

Specimens: LESICA, P. (5177). 1990. MONTU.



Eleocharis rostellata: Potosi Hot Springs (004)
USGS Potosi Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: EPIPACTIS GIGANTEA
Common Name: GIANT HELLEBORINE

Global rank: G4 Forest Service status: SENSITIVE
State rank: S2 Federal Status:

Element occurrence code: PMORC11010.014
Element occurrence type:

Survey site name: POTOSI HOT SPRINGS
EO rank: B
EO rank comments: LARGE POPULATION OVER LARGE AREA; WETLAND
COMMUNITIES IN GOOD CONDITION.

County: MADISON

USGS quadrangle: POTOSI PEAK

Township: Range: Section: TRS comments:
003S 002W 07 SW4

Precision: S
Survey date: 1990-07-18 Elevation: 6200 -
First observation: 1990 Slope/aspect: 0-35% - EAST, SOUTHEAST
Last observation: 1990-07-18 Size (acres): 2

Location:
CA. 20 AIR MILES NORTHWEST OF ENNIS; CA. 1.5 MILES NORTHEAST OF POTOSI
CAMPGROUND ON FS ROAD #160.

Element occurrence data:
101-1000 RAMETS IN FLOWER, MANY VEGETATIVE.

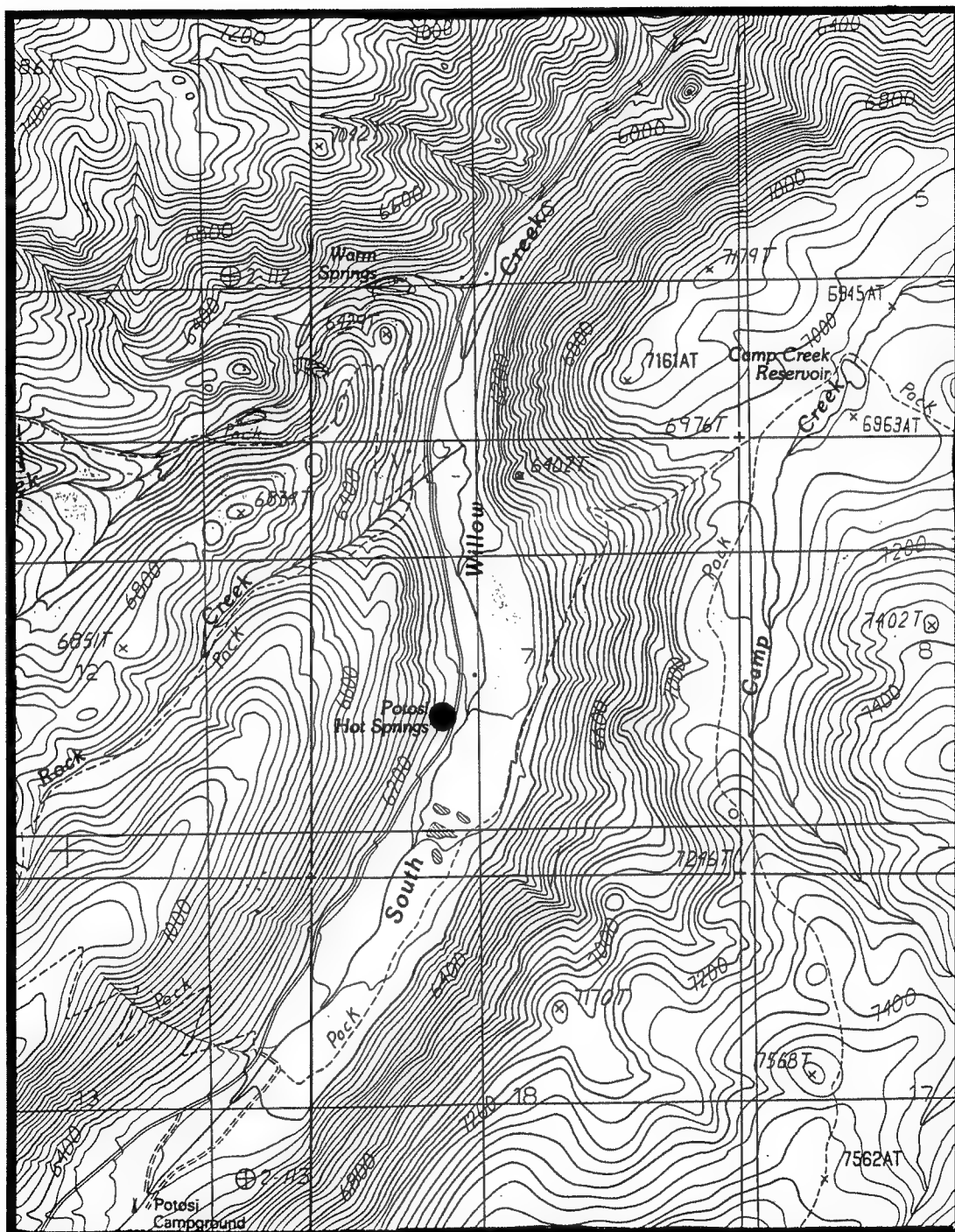
General site description:
ASSOCIATED SPECIES: HELIANTHUS NUTTALLII, ELEOCHARIS PALUSTRIS, BETULA
OCCIDENTALIS, CAREX OEDERI, PANICUM OCCIDENTALE, AGROSTIS ALBA.

Land owner/manager:
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:
DEVELOPMENT OF HOT SPRINGS AND PIPING OF WATER WOULD DESTROY UNIQUE
FEATURES. MANY EXOTICS IN UPLAND COMMUNITIES. SITE SURVEY SUMMARY ON
FILE AT MTNHP.

Information source: LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES,
UNIVERSITY OF MONTANA, MISSOULA, MT 59812.

Specimens: LESICA, P. (5176). 1990. MONTU.



Epipactis gigantea: Potosi Hot Springs (014)
USGS Potosi Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: POLYGONUM DOUGLASII SSP AUSTINAE
Common Name: AUSTIN'S KNOTWEED

Global rank: G5T4 Forest Service status: SENSITIVE
State rank: S2S3 Federal Status:

Element occurrence code: PDPGNOLOX1.010
Element occurrence type:

Survey site name: COAL PIT TRAIL
EO rank: BC
EO rank comments: SMALL POPULATION IN A POOR YEAR.

County: MADISON

USGS quadrangle: MANHEAD MOUNTAIN

Township: Range: Section: TRS comments:
001S 004W 27 NE4SW4; NW4SE4

Precision: S
Survey date: 1994-08-04 Elevation: 6520 - 6680
First observation: 1994-08-04 Slope/aspect: 10-25% / SW, S
Last observation: 1994-08-04 Size (acres): 2

Location:
TOBACCO ROOT MOUNTAINS, 0.75 MILE NORTH OF MILL CREEK TRAILHEAD ON
COAL PIT TRAIL.

Element occurrence data:
OCCASIONAL IN TWO OPENINGS REPRESENTING SUBPOPULATIONS, TOTALLING CA.
30 PLANTS. IN THE SOUTHERN SUBPOPULATION, ONLY DEAD PLANTS FROM 1993
WERE FOUND AND COUNTED.

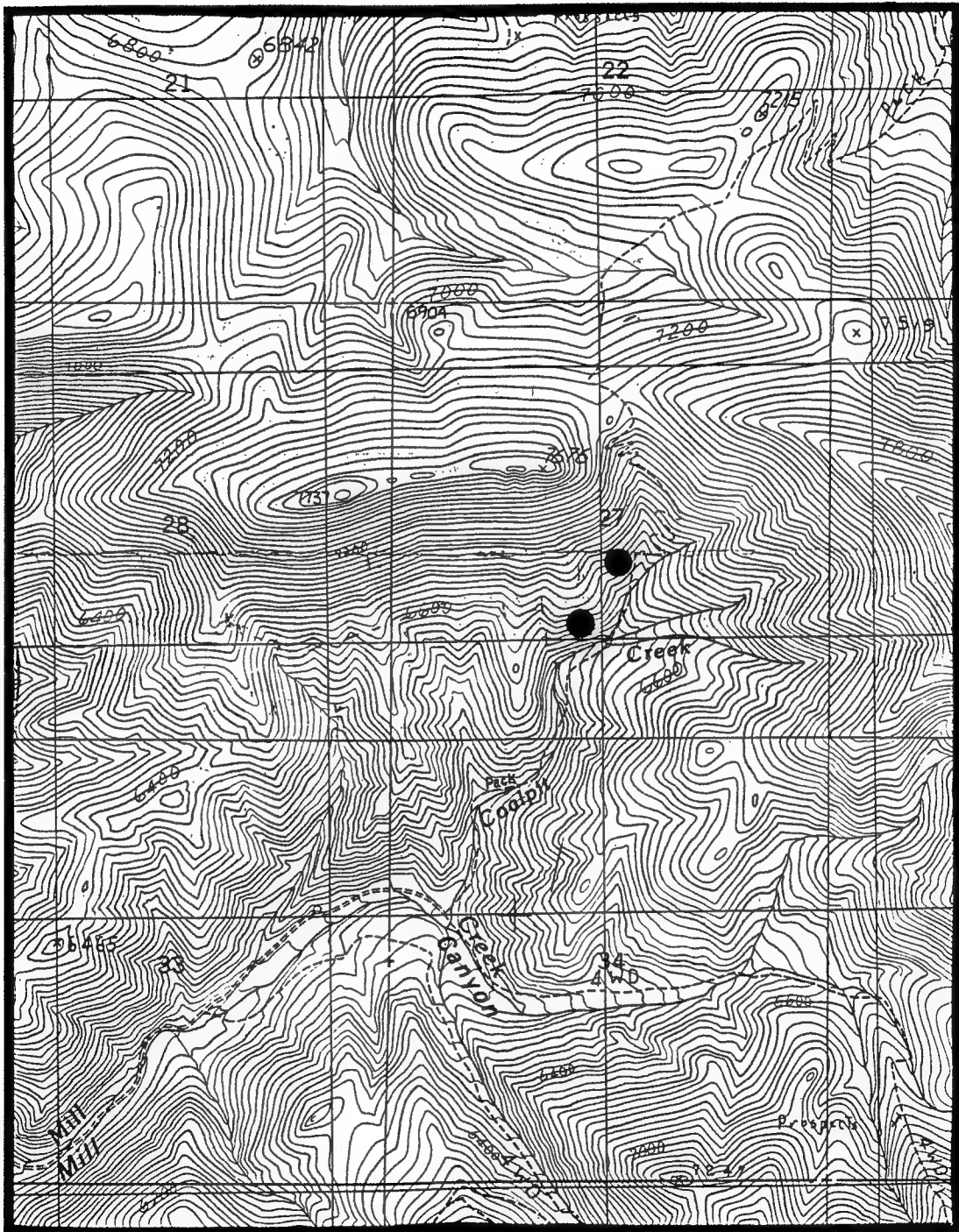
General site description:
SPARSELY-VEGETATED BARREN SLOPE OPENINGS IN PSEUDOTSUGA MENZIESII
FOREST, LOCALLY DOMINATED BY ARTEMISIA TRIDENTATA AND AGROPYRON
SPICATUM. THE UNSTABLE COBBLE SLOPE IS MADE UP OF METAMORPHICS
INTERMEDIATE BETWEEN SLATE AND SCHIST. OTHER ASSOCIATE SPECIES:
ARTEMISIA MICHAUXIANA, PENSTEMON DIPHYLLUS, GAYOPHYTON DECIPiens.

Land owner/manager:
DEERLODGE NATIONAL FOREST, JEFFERSON RANGER DISTRICT

Comments:

Information source: HEIDEL, BONNIE. [BOTANIST] MONTANA NATURAL
HERITAGE PROGRAM, 1515 EAST SIXTH AVENUE, P.O. BOX
201800, HELENA, MT 59620-1800. WORK: 406/444-3009.

Specimens: B. HEIDEL. 1994. (1302). MONT.



Polygonum douglasii ssp. *austinae*: Coal Pit Trail (010)
USGS Manhead Mountain 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: POTENTILLA QUINQUEFOLIA
Common Name: FIVE-LEAF CINQUEFOIL

Global rank: G4 Forest Service status:
State rank: S1 Federal Status:

Element occurrence code: PDROS1B152.005
Element occurrence type:

Survey site name: PERRY CANYON
EO rank:
EO rank comments:

County: MADISON

USGS quadrangle: WHITEHALL
MANHEAD MOUNTAIN

Township: Range: Section: TRS comments:
001S 004W 15 W2

Precision: S
Survey date: Elevation: 6300 - 6500
First observation: 1994-06-18 Slope/aspect: 0-2% / SOUTH, WEST
Last observation: 1994-06-18 Size (acres): 5

Location:
TOBACCO ROOT MOUNTAINS SOUTH OF WHITEHALL, CA. 5.25 MILES SOUTH ON FS
ROAD 1009 TO EDGE OF PERRY CANYON.

Element occurrence data:
OVER 20 PLANTS, UNCOMMON IN DISCONTINUOUS GAPS BETWEEN SHRUBS. IN
FLOWER 18 JUNE 1994.

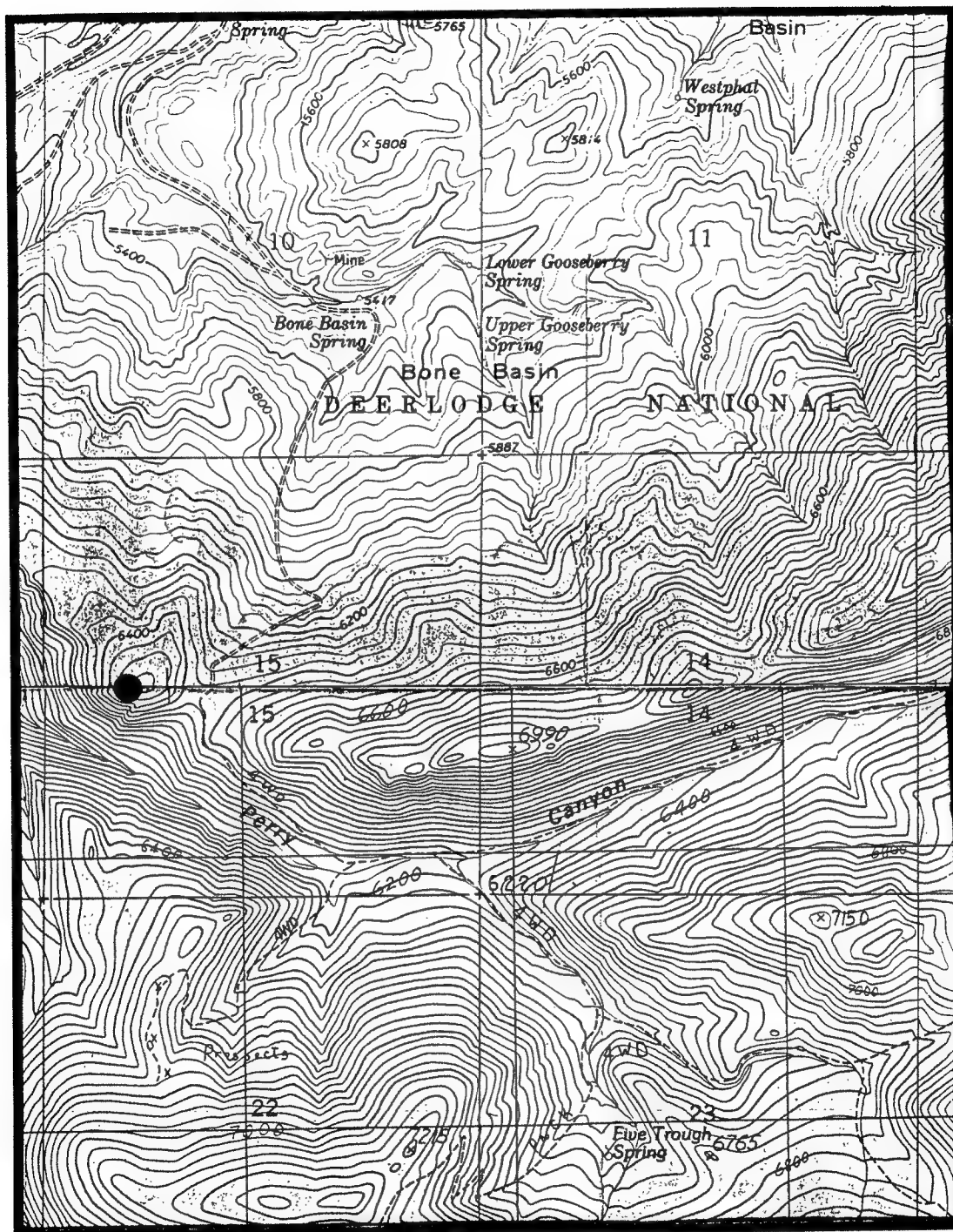
General site description:
BROKEN LIMESTONE RIDGETOP DOMINATED BY CERCOCARPUS LEDIFOLIUS, AT
CREST OF STEEP SOUTH-FACING SLOPE, FLANKED BY GENTLE FORESTED SLOPES.
ASSOCIATED SPECIES: CERCOCARPUS LEDIFOLIUS, AGROPYRON SPICATUM,
PENSTEMON ATTENUATUS, PHYSOCARPUS MALVACEUS, GUTTIEREZIA SAROTHRAE,
ERIGERON COMPOSITUS.

Land owner/manager:
DEERLODGE NATIONAL FOREST, JEFFERSON RANGER DISTRICT

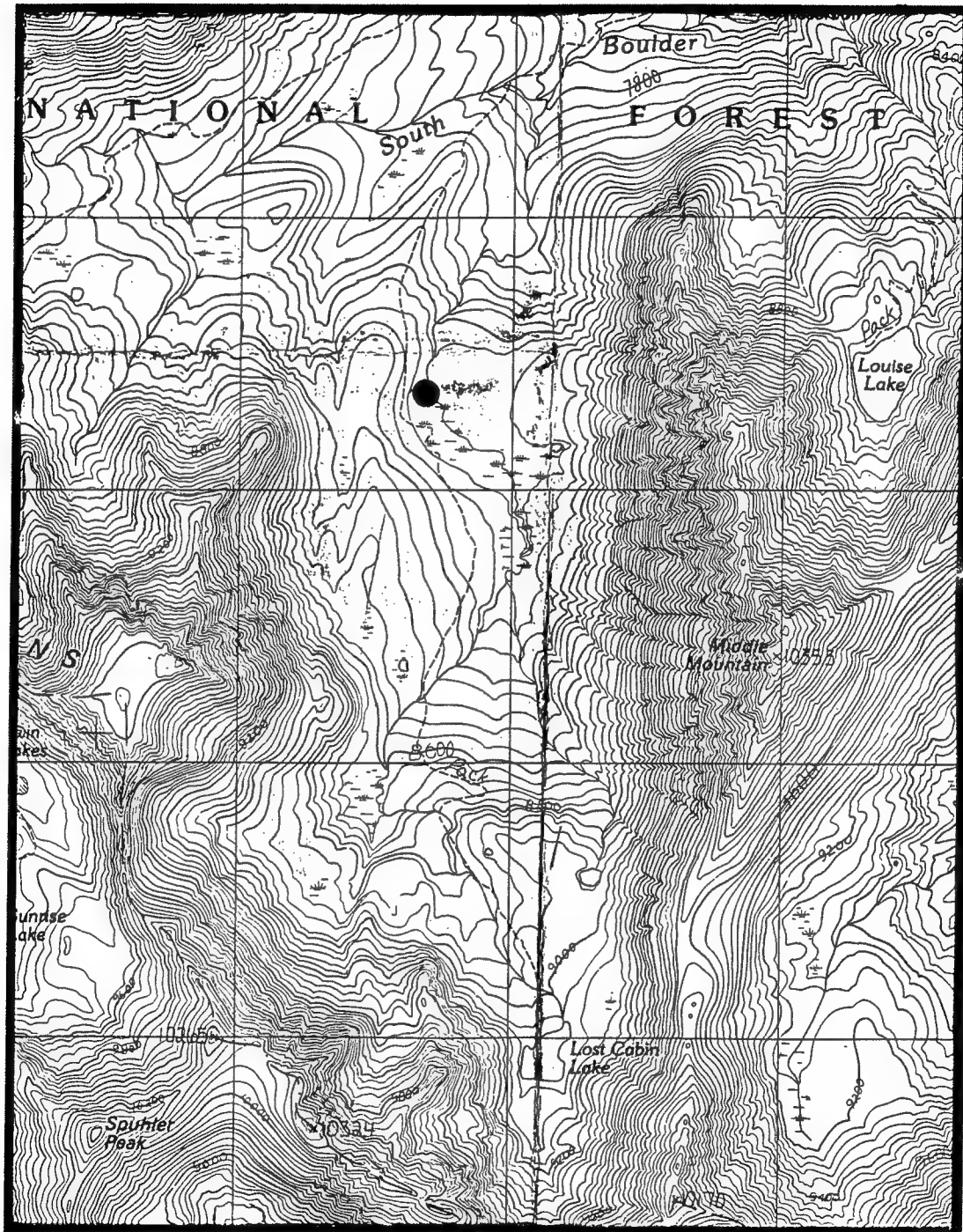
Comments:
THIS IS UNUSUALLY LOW ELEVATION HABITAT FOR THIS SPECIES. THE SPECIMEN
SHOULD BE SENT TO ERTTER WHEN SHE IS ACTIVELY WORKING ON THE GENUS.

Information source: BOTANIST, MONTANA NATURAL HERITAGE PROGRAM, 1515
EAST SIXTH AVENUE, HELENA, MT 59620-1800.

Specimens: HEIDEL, B. L. (1252). 1994. MONT. !J. R. RUMELY.



Potentilla quinquefolia: Perry Canyon (005)
 USGS Whitehall and Manhead Mountain 7.5' quadrangles



Selaginella selaginoides: Lost Cabin (007)
USGS Noble Peak 7.5' quadrangle

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: TARAXACUM ERIOPHORUM
Common Name: ROCKY MOUNTAIN DANDELION

Global rank: G4 Forest Service status:
State rank: S1 Federal Status:

Element occurrence code: PDAST930G0.003
Element occurrence type:

Survey site name: SHERIDAN
EO rank:
EO rank comments:

County: MADISON

USGS quadrangle: SHERIDAN

Township: Range: Section: TRS comments:
004S 005W 26

Precision: G
Survey date: Elevation: 5150 -
First observation: 1892 Slope/aspect:
Last observation: 1892-05-08 Size (acres):

Location:
SHERIDAN. (HISTORICAL RECORD).

Element occurrence data:
IN FLOWER.

General site description:
UNKNOWN.

Land owner/manager:
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:
GENERAL LOCATION ONLY.

Information source: BOTANIST, MONTANA NATURAL HERITAGE PROGRAM, 1515
EAST SIXTH AVENUE, HELENA, MT 59620-1800.

Specimens: FITCH, L. A. (S.N.). 1892. MONT.

APPENDIX D. Vascular Plants identified in the Tobacco Root Mountains. An asterisk (*) indicates a taxon adventive to the new world (50 taxa). B and D indicate taxa observed on the Beaverhead (412 taxa) and Deerlodge (461 taxa) National Forests respectively. 269 taxa were seen on both forests. A total of 604 taxa in 68 families were identified in the range. Taxa in **bold** typeface were collected by one or both of the authors; all specimens will be deposited at Montana State University (MONT) and duplicates will be sent to the University of Montana (MONTU).

PTERIDOPHYTES

EQUISETACEAE

Equisetum arvense BD
E. hyemale D
E. laevigatum D
E. variegatum D

ISOETACEAE

Isoetes bolanderi BD

OPHIOGLOSSACEAE

Bortrychium lunaria B
B. simplex D

POLYPODIACEAE

Athyrium filix-femina B
Cheilanthes feei D
Cryptogramma acrostichoides D
Cystopteris fragilis BD
Woodsia oregana D

SELAGINELLACEAE

Sellaginella densa BD
S. selaginoides D
S. watsonii BD

GYMNOSPERMS

CUPRESSACEAE

Juniperus communis BD
J. horizontalis B
J. scopulorum BD

PINACEAE

Abies lasiocarpa BD
Picea engelmannii BD
P. glauca? BD
Pinus albicaulis B
P. contorta BD
P. flexilis BD
Pseudotsuga menziesii BD

ANGIOSPERMS

ACERACEAE

Acer glabrum D

APIACEAE

Angelica arguta B
A. dawsonii BD
Bupleurum americanum BD
Cymopterus nivalis D
*Foeniculum vulgare** B
Heracleum sphondylium BD
Ligusticum tenuifolium B
Lomatium ambiguum B
L. cous BD
L. dissectum D
L. triternatum BD
Osmorhiza depauperata BD
O. occidentalis B
Pastinaca sativa* B
Perideridia gairdneri BD

APOCYNACEAE

Apocynum androsaemifolium D

ASTERACEAE

Achillea millefolium BD
Agoseris aurantiaca BD
A. glauca BD
A. lackschewitzii BD
Anaphalis margaritacea BD
Antennaria alpina BD
A. anaphaloides BD
A. aromatica BD
A. corymbosa D
A. microphylla BD
A. parvifolia BD
A. racemosa BD
A. umbrinella BD
Arnica amplexicaulis B
A. cordifolia BD
A. diversifolia D
A. longifolia B
A. mollis BD
A. parryi B
Artemisia ludoviciana BD

A. campestris D
A. dracunculus BD
A. frigida BD
A. ludoviciana D
A. michauxiana BD
A. tridentata
 var. *vaseyana* BD
Aster alpigenus BD
A. conspicuus D
A. foliaceus BD
A. integrifolius B
A. laevis D
A. modestus B
Balsamorhiza sagittata BD
*Carduus nutans** BD
Centaurea maculosa D*
Chaenactis alpina D
C. douglasii D
Chrysothamnus nauseosus D
*Cirsium arvense** BD
C. flodmanii D
C. hookerianum B
Crepis acuminata BD
C. atribarba D
C. elegans D
Erigeron compositus BD
E. corymbosus D
E. peregrinus BD
E. simplex BD
E. speciosus B
E. ursinus B
*Filago arvensis** D
Gaillardia aristata BD
Gnaphalium microcephalum BD
Grindelia squarrosa BD
Gutierrezia sarothrae D
Haplopappus acaulis D
H. lyallii BD
H. suffruticosus B
H. uniflora B
Helianthella uniflora B
Heterotheca horrida D
Hieracium albiflorum BD
H. cynoglossoides B
H. gracile BD
Hulsea algida BD
Hymenoxys acaulis BD
H. grandiflora BD
Liatris punctata D
Lygodesmia juncea D
Matricaria matricarioides D
Microseris nutans D
Nothocalais nigrescens B
Rudbeckia occidentalis BD
Senecio canus D

S. crassulus B
S. cymbalaria D
S. cymbalarioides B
S. fremontii BD
S. integerrimus BD
S. pseud aureus BD
S. serra BD
S. triangularis BD
Solidago canadensis BD
S. missouriensis BD
S. multiradiata BD
S. occidentalis D
Stephanomeria tenuifolia D
*Tanacetum vulgare** BD
Taraxacum ceratophorum D
*T. laevigatum** D
*T. officinale** BD
Thelesperma marginatum D
Townsendia parryi D
*Tragopogon dubius** BD

BERBERIDACEAE

Mahonia repens BD

BETULACEAE

Alnus incana BD
A. viridis B
Betula glandulosa B
B. occidentalis D

BORAGINACEAE

Cryptantha celosioides D
C. torreyana D
*Cynoglossum officinale** BD
Eritrichium nanum BD
Hackelia floribunda D
Lappula redowskii D
Lithospermum incisum D
L. ruderales BD
Mertensia alpina B
M. ciliata BD
M. paniculata D
Onosmodium molle B

BRASSICACEAE

Arabis hirsuta D
A. lemmonii B
A. lyallii B
*Berteroa incana** D
*Brassica kaber** BD
*Camelina microcarpa** D
*Capsella bursa-pastoris** B
Cardamine oligosperma B
Descurainia incana BD

*D. sophia** B
Draba crassifolia B
D. nemorosa D
D. oligosperma BD
D. incerta B
D. stenoloba BD
D. sp. novum BD
D. ventosa B
Erysimum asperum D
E. inconspicuum D
*Lepidium campestre** BD
*L. densiflorum** D
L. ramosissimum D
Lesquerella alpina D
Physaria didymocarpa BD
P. geyeri D
Rorippa sinuata BD
*Sisymbrium altissimum** D
Smelowskia calycina BD
*Thlaspi arvense** BD

CACTACEAE

Opuntia polyacantha BD

CALLITRICHACEAE

Callitriche heterophylla D

CAMPANULACEAE

Campanula rotundifolia BD

CAPRIFOLIACEAE

Linnaea borealis BD
Lonicera utahensis BD
Sambucus racemosa BD
Symphoricarpos albus BD
S. occidentalis D
S. oreophilus BD

CARYOPHYLLACEAE

Arenaria congesta B
A. nuttallii D
A. obtusiloba B
A. rossii BD
Cerastium arvense BD
Paronychia sessiliflora B
*Sagina procumbens**
Silene acaulis BD
S. douglasii D
S. parryi B
S. repens D
Spergularia rubra* BD
Stellaria calycantha D
S. crassifolia D
*S. longifolia** D

S. media B

CHENOPODIACEAE

*Chenopodium album** D
C. fremontii B
C. rubrum D
Krascheninnikovia lanata D
Monolepis nuttalliana D

CORNACEAE

Cornus sericea BD

CRASSULACEAE

Sedum integrifolium BD
S. lanceolatum BD

CYPERACEAE

Carex aquatilis BD
C. atherodes BD
C. atrata BD
C. aurea D
C. backii D
C. canescens BD
C. capillaris D
C. disperma BD
C. elynoides D
C. foena D
C. foetida D
C. geyeri B
C. gynocrates D
C. limosa B
C. luzulina
 var *ablata* D
C. microptera B
C. multicostata ? D
C. nardina D
C. nebrascensis BD
C. neurophora B
C. nigricans D
C. oederi B
C. petasata D
C. praeceptorum B
C. praegracilis D
C. raynoldsii BD
C. saxatilis D
C. scopulorum BD
C. simulata B
C. sprengelii D
C. utriculata BD
C. vesicaria BD
Eleocharis palustris BD
E. pauciflora B
Eriophorum chamissonis B
E. polystachion B

ELEAGNACEAE

Shepherdia canadensis BD

ERICACEAE

Arctostaphylos uva-ursi BD
Cassiope mertensiana BD
Chimaphila umbellata BD
Gaultheria humifusa D
Hypopitys monotropa B
Kalmia microphylla D
Ledum glandulosum BD
Moneses uniflora BD
Orthilia secunda B
Phyllodoce empetriformis BD
Pterospora andromedea BD
Pyrola asarifolia BD
P. chlorantha BD
P. elliptica D
Vaccinium membranaceum BD
V. scoparium BD

EUPHORBIACEAE

Euphorbia esula* D

FABACEAE

Astragalus adsurgens B
A. alpinus B
A. crassicaulus D
A. drummondii BD
A. eucosmus BD
A. miser BD
A. purshii BD
A. spatulatus D
A. vexilliflexus D
Glycyrrhiza lepidota D
Hedysarum sulphurescens BD
Lupinus argenteus BD
L. polyphyllus
 var. prunophilus B
L. sericeus BD
Medicago lupulina* BD
M. sativa* D
Melilotus officinalis* D
Onobrychis viciifolia* D
Oxytropis lagopus
 var. lagopus BD
O. sericea BD
Trifolium dasyphyllum BD
T. haydenii B
T. parryi B
T. pratense* BD
T. repens* BD
Vicia americana D
V. sativa* D

FUMARIACEAE

Corydalis aurea D

GENTIANACEAE

Frasera speciosa BD
Gentiana algida B
G. calycosa BD
Gentianella amarella D
Swertia perennis BD

GERANIACEAE

Geranium richardsonii BD
G. viscosissimum BD

GROSSULARIACEAE

Ribes americanum B
R. cereum BD
R. hendersonii BD
R. lacustre B
R. setosum B

HYDROPHYLLACEAE

Phacelia hastata BD
P. heterophylla B
P. linearis D
P. lyallii B
P. sericea BD

IRIDACEAE

Iris missouriensis D
Sisyrinchium montanum BD

JUNCACEAE

Juncus balticus BD
J. castaneus D
J. confusus B
J. drummondii B
J. ensifolius
 var. ensifolius B
J. mertensianus B
J. nevadensis B
J. parryi
 ssp. parryi B
J. regelii B
J. tracyi B
Luzula arcuata B
L. campestris BD
L. glabrata D
L. parviflora BD
L. spicata BD

JUNCAGINACEAE

Triglochin palustre D

LAMIACEAE

Agastache urticifolia BD
Marrubium vulgare* D
Monarda fistulosa BD
Prunella vulgaris BD

LENTIBULARIACEAE

Utricularia minor B

LILIACEAE

Allium cernuum BD
A. schoenoprasum BD
A. textile D
Disporum trachycarpum BD
Erythronium grandiflorum BD
Fritillaria atropurpurea D
F. pudica BD
Lloydia serotina B
Maianthemum racemosum BD
M. stellatum BD
Streptopus amplexifolius B
Tofieldia glutinosa BD
Veratrum viride B
Zigadenus elegans B

LINACEAE

Linum lewisii D

MALVACEAE

Iliamna rivularis B
Sphaeralcea coccinea D

MENYANTHACEAE

Menyanthes trifoliata B

NYCTAGINACEAE

Mirabilis linearis D

NYMPHAEACEAE

Nuphar variegatum B

ONAGRACEAE

Calyophus serrulatus D
Epilobium anagallidifolium BD
E. angustifolium B
E. brachycarpum BD
E. ciliatum B
Gayophytum decipiens D
Oenothera cespitosa BD
O. villosa D

ORCHIDACEAE

Corallorhiza maculata B
C. trifida D
Goodyera oblongifolia BD

Habenaria dilatata BD
H. unalascensis BD
H. saccata BD
Listera cordata D
Spiranthes romanzoffiana BD

OROBANCHACEAE

Orobanche fasciculata D

PLANTAGINACEAE

Plantago major* D
P. patagonica D

POACEAE

Agrostis scabra BD
A. thurberiana D
A. variabilis D
Aristida purpurea D
Bouteloua gracilis D
Bromus anomalus D
B. carinatus B
B. inermis* BD
B. japonicus* D
B. pumpellianus BD
B. tectorum* BD
Calamagrostis canadensis BD
C. inexpansa D
C. purpurascens BD
C. rubescens BD
Catabrosa aquatica D
Cinna latifolia D
Dactylis glomerata* BD
Danthonia intermedia BD
Deschampsia cespitosa BD
D. elongata D
Elymus cinereus BD
E. elymoides BD
E. glaucus B
E. hispidus* B
E. scribneri BD
E. spicatus BD
Festuca idahoensis BD
F. octoflora* D
F. ovina B
F. scabrella D
Glyceria borealis B
G. elata B
G. grandis B
G. striata D
Hordeum brachyantherum B
Koeleria macrantha BD
Melica bulbosa D
M. spectabilis B

M. subulata B
Muhlenbergia filiformis B
M. richardsonis D
Oryzopsis exigua D
O. hymenoides D
O. micrantha D
Phleum alpinum BD
*P. pratense** BD
Poa alpina B
*P. compressa** D
P. cusickii D
P. nervosa B
*P. palustis** D
*P. pratensis** B
P. rupicola B
P. scabrella BD
Stipa comata D
S. nelsonii BD
S. viridula D
Trisetum spicatum BD
T. wolfii B

POLEMONIACEAE

Collomia linearis BD
Ipomopsis spicata B
Linanthus septentrionalis BD
Micosteris gracilis BD
Phlox alyssifolia D
P. longifolia BD
P. pulvinata BD
Polemonium pulcherrimum BD
P. viscosum B

POLYGONACEAE

Eriogonum flavum BD
E. mancum D
E. ovalifolium BD
E. strictum D
E. umbellatum BD
Oxyria digyna BD
*Polygonum aviculare** D
P. bistortoides BD
P. douglasii
 ssp. douglasii BD
 ssp. austinae D
P. erectum D
P. ramosissimum D
P. viviparum BD
Rumex acetosa?* B
*R. acetosella** B
R. aquatilis
 var. fenestratus B
*R. crispus** B
R. salicifolius D

PORTULACACEAE

Claytonia lanceolata
 var. flava BD
 var. lanceolata D
Lewisia pygmaea BD
L. rediviva D
Spraguea umbellata BD

POTAMOGETONACEAE

Potamogeton amplifolius D
P. praelongus D

PRIMULACEAE

Androsace filiformis D
A. occidentalis B
A. septentrionalis D
Dodecatheon conjugens BD
D. pulchellum BD
Douglasia montana BD

RANUNCULACEAE

Actaea rubra BD
Anemone multifida D
A. patens BD
Aquilegia flavescens BD
Caltha leptosepala BD
Clematis columbiana BD
C. hirsutissima B
C. occidentalis B
Delphinium bicolor
 ssp. bicolor BD
 ssp. novum D
D. glaucum D
D. nuttallianum D
D. occidentale BD
Ranunculus abortivus BD
R. alismifolius BD
R. eschscholtzii B
R. flammula BD
R. glaberrimus D
R. inamoenus B
R. scleratus B
R. uncinatus B
Thalictrum occidentale B
Trollius laxus BD

RHAMNACEAE

Ceanothus velutinus B

ROSACEAE

Amelanchier alnifolia D
Cercocarpus ledifolius D
Dryas octopetala BD
Fragaria vesca BD
F. virginiana B

Geum aleppicum D
G. macrophyllum BD
G. rossii BD
G. triflorum BD
Petrophyton caespitosum D
Physocarpus malvaceus D
Potentilla anserina B
P. arguta B
P. diversifolia
 var. diversifolia BD
P. fissa B
P. fruticosa BD
P. glandulosa B
P. gracilis BD
P. norvegica D
P. ovina D
P. quinquefolia D
Prunus virginiana BD
Rosa arkansana D
R. sayi D
R. woodsii BD
Rubus idaeus BD
R. parviflorus BD
Sibbaldia procumbens BD
Sorbus scopulina B
Spiraea betulifolia BD
S. splendens B

RUBIACEAE

Galium aparine D
G. boreale BD
G. triflorum B

SALICACEAE

Populus angustifolia BD
P. balsamifera B
P. deltoides D
P. tremuloides BD
Salix arctica B
S. bebbiana BD
S. drummondiana BD
S. eastwoodiae B
S. farriae B
S. lemmonii BD
S. planifolia BD
S. reticulata BD
S. tweedyi D
S. wolfii
 var. **idahoensis** B
S. vestita B

SANTALACEAE

Comandra umbellata D

SAXIFRAGACEAE

Heuchera grossulariifolia BD
H. parvifolia BD
Lithophragma parviflorum D
Mitella breweri BD
Parnassia fimbriata BD
Saxifraga bronchialis BD
S. cernua D
S. flagellaris B
S. odontoloma B
S. oregana B
S. rhomboidea BD
S. rivularis B
Telesonix jamesii D

SCROPHULARIACEAE

Besseya wyomingensis BD
Castilleja cusickii BD
C. linariifolia BD
C. miniata B
C. nivea B
C. pallescens D
C. rhexifolia B
Collinsia parviflora BD
Mimulus guttatus BD
M. lewisii BD
M. moschatus B
Pedicularis bracteosa BD
P. contorta BD
P. groenlandica BD
P. racemosa BD
Penstemon aridus BD
P. attenuatus
 var. **pseudoprocerus** D
P. diphyllus D
P. eriantherus BD
P. procerus BD
Synthyris pinnatifida BD
Verbascum thapsus* D
Veronica americana BD
V. biloba D
V. peregrina D
V. serpyllifolia BD
V. wormskjoldii BD

SOLANACEAE

Hyoscyamus niger* D
Solanum triflorum BD

SPARGANIACEAE

Sparganium emersum B

URTICACEAE

Parietaria pensylvanica D
Urtica dioica D

VALERIANACEAE

Valeriana dioica D
V. occidentalis BD
V. sitchensis B

VERBENACEAE

Verbena bracteata D

VIOLACEAE

Viola adunca BD
V. canadensis BD
V. macloskeyi BD
V. nephrophylla B
V. vallicola BD